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## Original Communications

### PLACENTA CIRCUMVALLATA\*

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(From the Obstetrical Department of the Johns Hopkins Hospital and University)

IN THE course of the systematic examination of a large series of placentae during the past few years, my attention was drawn, as never before, to this abnormality, and, upon finding that I encountered it several times in the 150 or more placentae which pass through my hands each month, I began to study it with care. Each specimen was preserved in toto and photographed and, after hardening, blocks were excised from appropriate areas and submitted to microscopic study. When some thirty specimens had been studied, I thought that I would be able to make a substantial contribution to the anatomic structure and mode of production of the abnormality; but when I came to review the abundant literature, I found that such was not the case, but instead that each of my presumably new observations had previously been made by others. At the same time, I found that the literature abounded in contradictory statements upon every point, whether anatomic or clinical, and that many of the theories concerning its mode of production were so manifestly incorrect; I thought it might be profitable to review the subject briefly and to record my own observations.

Figs. 1 to 3 are photographic reproductions of three of my specimens and clearly illustrate the salient gross features of the abnormality, the most striking of which consists in the presence of a more or less complete circular ring upon the fetal surface of the placenta at varying distances from its margin. The ring varies from 0.5 to 1.5 cm. in width, is slightly elevated above the general surface, and usually presents a whitish or yellowish opaque appearance. If the ring is complete, it divides the fetal surface into two distinct areas, a central portion bounded by the inner margin of the ring and a lateral

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zone peripheral to it. Usually the ring lies somewhat eccentrically, so that the width of the peripheral portion may vary greatly in different locations.

The central area presents the appearance which is common to the fetal surface of the normal placenta. To it the cord is attached, and over it course the large fetal vessels. The latter are uniformly absent from the peripheral portion, and their terminal branches turn directly downward into the substance of the organ before reaching the ring.

The inner margin of the ring is sometimes rounded, but more commonly it is quite sharp and appears as a flattened fold, over which

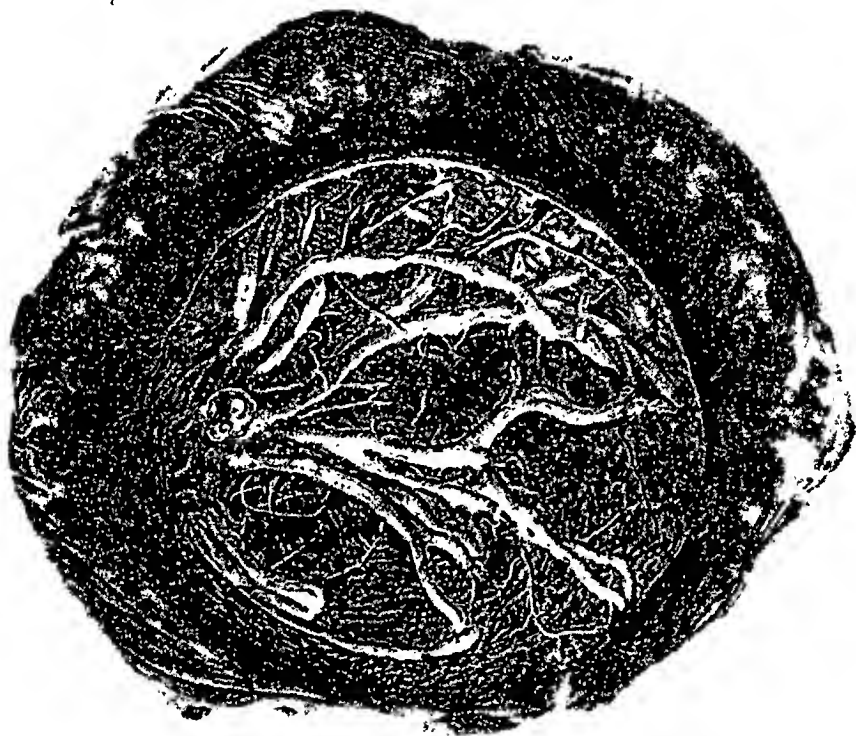


Fig. 1.—Complete placenta circumvallata.  $\times \frac{3}{4}$

the amnion extends on its way from the central to the peripheral portion of the placenta. On casual examination, as shown in Figs. 1 and 3, the fetal membranes appear to extend over the ring to the periphery of the placenta, but closer investigation shows that they do not constitute an integral part of the peripheral zone but, instead, are very loosely attached to the fetal surface of the placenta, and, upon being detached leave exposed a reddish, slightly roughened underlying tissue, which as will be pointed out later, consists of decidua (Fig. 2).

In other words, the fetal membranes, instead of being deflected, as normally, from the free margin of the placenta, arise from the outer margin of the ring and are only loosely applied to the portion beyond it.

Furthermore, the chorionic membrane, instead of making up the entire fetal surface of the placenta, has become reduced in area, and peripheral to the ring is surrounded by an extrachorionic portion which is covered by decidua. In the detached normal placenta only the maternal surface is covered by decidua, but in this abnormality a considerable portion of the fetal surface is likewise so covered.

Before attempting to explain why this is the case, or entering into any discussion of the mode of production of this abnormality, I shall give a brief review of its history and of the various attempts which have been made to explain its genesis, and incidentally I shall discuss the terminology employed in connection with it. Although placenta circumvallata must have occurred from time immemorial, many Ger-

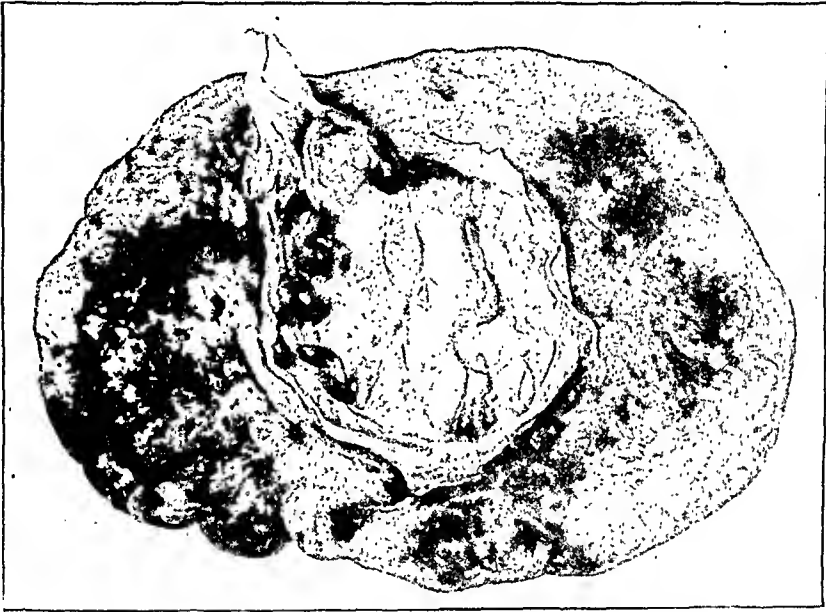


Fig. 2.—Placenta circumvallata with unusually small chorionic membrane and unusually wide extrachorionic portion of fetal surface.  $\times \frac{3}{4}$

man writers state that it was first described by William Hunter, but I have been unable to locate his description. The condition was incidentally mentioned by Busch in 1836, who introduced the term "annulus fibrosus" in connection with it, but to Köllicker must be ascribed the credit of having directed especial attention to it; as, in the second edition of his textbook on *Embryology* (1879), he accurately described the abnormality, stated that it was of relatively frequent occurrence, and thereby stimulated subsequent investigation. It might also be mentioned that Roncaglia states that Fabbri had antedated Köllicker by several years. While this is doubtless correct, it does not alter the fact that it was the impetus given by Köllicker which aroused the interest of German investigators in the subject.

It would appear that considerable confusion in terminology exists, and that many writers employ the terms placenta circumvallata and

marginata indiscriminately, while such designations as placenta marginé, brodé and collarete are employed by the French. This is so true, that Riehl in 1924 stated that one may have to deal with several varieties of placenta "marginé" instead of with a single one, and in my reading I have often found it impossible to obtain a clear idea of what the various authors had in mind. This is probably due to the fact that under the designation marginata various conditions, beside placenta circumvallata, have been included—one of the most common being the ordinary marginal infarct, in which a narrow band of white infarcted tissue completely or partially encircles the margin of the placenta or may lie several centimeters inside of it. This, however,

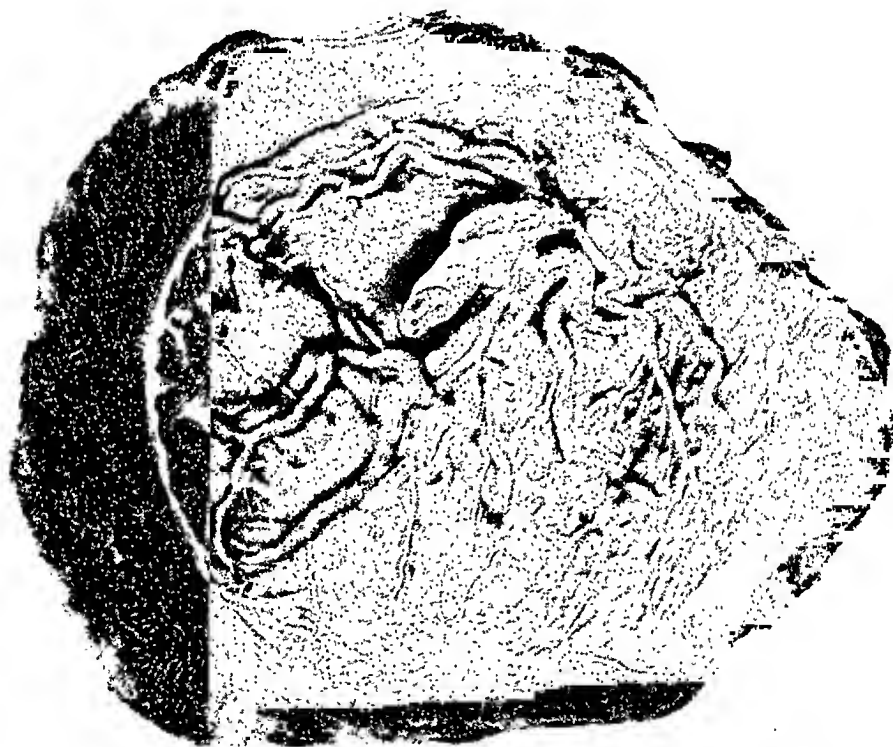


Fig. 3.—Partial placental circumvallata.  $\times \frac{3}{4}$

has nothing in common with the condition under discussion, as it is due to the deposition of a layer of "fibrinoid" upon the maternal surface of the chorionic membrane, and not to a fundamental disturbance in the structure of the placenta and in the relation of its membranes.

For these reasons, I think it advisable to discard entirely the term marginata and similar designations, to restrict the term circumvallate solely to the condition under consideration and to describe as marginal infarcts at least some of the conditions to which reference has been made. That some change is imperative is shown by the great

discrepancy in the statements of various authors concerning the frequency of placenta marginata. Herff, Bertkau, Funck, Del Viyo, and Corinaldes report an incidence of 7.6, 14, 20.9 and 21.3 per cent respectively, whereas I have encountered circumvallate placentae in less than two per cent of my material. Consequently, it is apparent that the figures just mentioned could have been obtained only by including various other conditions under the designation marginata. That such a supposition is correct is rendered probable by the statement of Bertkau that, while placenta marginata was noted in 14 per cent of his material, the incidence of the true circumvallate variety did not exceed 1.3 per cent,—a figure which tallies closely with my own.

Passing on to a review of the various explanations which have been advanced concerning the mode of production of the circumvallate placenta, it should be remembered that a correct explanation could scarcely have been expected until our views concerning the mechanisms involved in the implantation of the normal human ovum and in the early stages of placentation had become clarified. In this connection it should be recalled that Peters' ovum was not described until 1899, and that some years elapsed before its implications were generally accepted by embryologists, and a still longer period before the rank and file of obstetricians were able to free themselves from old and erroneous teachings. Furthermore, it must be borne in mind that any theory concerning the origin of the circumvallate placenta must afford a reasonable explanation for the following facts:

1. The restriction of the chorionic membrane to the central portion of the fetal surface of the placenta.
2. The extension of the membranes from the outer margin of the ring instead of from the periphery of the placenta.
3. The presence of a decidual covering over the peripheral extra-chorionic portion of the fetal surface of the placenta.
4. The folded appearance of the inner margin of the ring, and
5. The structure and mode of formation of the "annulus fibrosus."

Approximately speaking, the theories advanced in explanation of the genesis of the abnormality may be grouped in one of the following categories:

1. Endometritis and inflammation of the decidua.
2. Proliferation and induration of the decidua marginalis (Rand-reflexa).
3. Deep implantation of the ovum upon a restricted area of the decidua basalis.
4. Mechanical interference with implantation associated with the presence of double ovum twins.
5. Abnormal mobility of the fetal membranes ("Stauchung").
6. Primary insertion of the ovum in a uterine cornu ("Tubenecke Placenta").
7. Lack of coordination between the several factors which regulate the growth of the placenta and of the uterine wall, as well as variations in the intrauterine and intraplacental fluid pressures.

8. Early rupture of the decidua capsularis and subsequent partial strangulation of the placenta.
9. Splitting of the decidua vera.
10. A primary restriction in the development of the chorion frondosum.

I shall consider each of these categories as briefly as possible, referring those interested in details to the publications of the several writers.

1. As early as 1885 Veit contended that inflammation of the endometrium or of the decidua afforded a satisfactory explanation for the production of the abnormality. He advanced no proof in support of his contention, but simply stated that he believed in its efficiency. For a time he found numerous adherents, but, after Krömer and Sfameni had expressed their skepticism, the theory gradually fell into desuetude. I need only state the inflammatory changes were present in only one of our specimens, and in that instance it could have played no causal rôle, as it had originated during the course of labor as the result of an incidental intrapartum infection.

2. In 1890, while still under the domination of old and erroneous views concerning implantation and placentation, Klein stated that if, as the result of inflammation, the "Rand-decidua," that is, the portion of the capsularis immediately adjoining the basalis, became thickened and indurated, it could prevent any further expansion of the chorionic membrane, so that if further growth of the villi were essential to the development of the ovum it could only occur beneath the indurated ring, so that eventually the extra chorionic portion of the fetal surface of the placenta would inevitably be covered by decidua. Klein's theory was accepted by Schwab, and partially by Krömer, although the latter was dubious concerning the part played by inflammation. At present, this view has only an historical interest, as we now know that the decidua does not grow up over and enclose the ovum as was believed at that time.

3. In the early eighties of the last century, Schatz, Küstner and others were inclined to attribute the condition to the fact that the ovum had become inserted upon an abnormally small area of the decidua basalis, so that if the pregnancy was to continue it would necessitate deep invasion of the decidua by the chorionic villi, with the result that the ovum would project in a polypoid-like manner, with a restricted chorionic membrane. This view can no longer be held for two reasons: first, that it is based upon erroneous conceptions concerning the process of implantation, and, second, because all early ova of the first month, which have been studied in situ, have been found to be implanted in the most superficial portion of the decidua.

4. Schatz, Krukenberg, Herff, Funck and others directed attention to the fact that the abnormality is not unusual in double ovum twins, because owing to lack of room the membranes of one twin displace in part those of the other. In this event, a part of the membranes of fetus I might come to cover part of the fetal surface of the placenta of fetus II, and thus simulate to some extent the conditions noted in placenta circumvallata. Apart from the fact that this theory can apply only to twin pregnancy, it must be abandoned; as, even in such circumstances, it could explain only the dislocation of the membranes and not the other more striking anatomic peculiarities of the placenta in question.

5. In 1906, Liepmann studied four pregnant uteri in which more or less crescentic folds of membranes projected into the interior of the uterine cavity and overlapped one margin of the placenta to a greater or lesser extent. He considered that it was only necessary for such a fold to become flattened out in order to give rise to the

circumvallate or marginate type. Furthermore, he held that the production of the folds was incidental to variations in the fluid pressure exerted by the amniotic fluid, as well as to variations in the intensity of the Braxton Hicks contractions, and were of the same character as motions imparted by pressure with the balls of the fingers to a piece of cloth stretched over a board and which he designated as "Stauchung." Bumm partially endorsed this mechanism, and he and Liepmann considered that it would be especially effective when the placenta was abnormally inserted in the lower segment or in a cornu of the uterus. To my mind, the theory is defective in that it is applicable only to partially circumvallate placentae, but more especially because it overemphasizes the importance of the membranous fold, and neglects such more important features as the restricted chorionic area and the presence of decidua upon the extrachorionic fetal surface of the placenta.

6. Although the part played in the production of this abnormality by the insertion of the ovum in a uterine cornu had been mentioned by others, it owes its greatest development to the monograph of Bayer which appeared in 1911. He stated that implantation frequently occurred in that locality and that its possibilities for harm were generally overlooked. He pointed out that the behavior of the junction of the tubal opening with the uterine cavity was comparable to that of the lower uterine segment, in that as pregnancy advances more and more of the tube becomes incorporated into the uterine cavity, with the result that the chorionic membrane becomes torn off from its villi in that region, and could then readily form a fold which might apply itself to the fetal surface of the placenta and become flattened out over it as pregnancy advanced. He was aware that his explanation was not universally applicable, and theoretically could hold good only for partial varieties of the abnormality, but at the same time, he believed that it was probably applicable in quite as many instances as the small basic theory of Schatz and Küstner. Here again, it would seem that, in common with the proponents of several other theories, he laid more stress upon the production of the ring than upon the other and more fundamental anomalies of the abnormality in question. In any event, this "Tubenecke" theory has played a considerable part in the doctrine of placenta marginata, and is mentioned whenever it is considered.

7. Sfameni in a seventy-page monograph, which appeared in 1908, stated that none of the theories advanced up to that time were of universal application, nor did they suffice to account for certain anatomic or clinical peculiarities in the individual specimens. He stated that in every pregnancy the form of the placenta is governed by the association and interaction of all or several of the following three factors: 1. the growth of the uterine muscle; 2. the intraovular pressure; and 3. the interlacunal pressure—or the pressure exerted by the blood in the intervillous spaces, as well as by the growing villi. He then pointed out that the placenta in its earlier stages is cup-shaped, and assumes its discoidal form only as pregnancy advances. He held that the force exerted by the growing uterine muscle tends to bring about enlargement of the area of placental attachment; that that exerted by the intraovular pressure tends to flatten the organ, while the interlacunal pressure tends to make it thicker. Consequently, if all three forces act in unison the placenta will presumably be normal in form, whereas if the intraovular pressure is too feeble, or the muscular activity too strong, abnormalities are likely to result. It would lead too far to attempt to follow his reasoning in detail, but it will suffice to say that it appeared satisfactory to the author, but not entirely so to me. It is interesting to note that Hinselmann, in his almost incomprehensible and lengthy article in volume VI of *Biologie und Pathologie des Weibes*, inclines to a somewhat similar view, but admits that the problem is far from solution. Del Vivo and Corinaldes, likewise favor this view.



8. Lahm in 1924 advanced a new theory, in which he assumed that the egg had originally been deeply implanted in the decidua, and that as it increased in size the capsularis ruptured, probably through the scar marking the original point of ingress of the ovum, and through that opening the membranes and their contents (chorion, amnion and embryo) slowly escaped into the uterine cavity so that eventually all that remained at the original area of implantation was the chorion frondosum, which became sharply constricted by the decidual collar. He holds that the latter will eventually thin out and supply a decidual covering for the extrachorionic fetal portion of the placenta; while as the ovum expands the portion of membranes just beyond the collar would be folded back and give rise to the ring. The theory, while ingenious, does not appeal to me, for the reason that, in many of my full term specimens, traces of the decidua capsularis can be detected exactly where they should be lacking if Lahm's hypothesis were correct, that is outside of the chorion laeve, and separating it from the extrachorionic portion of the placenta.

9. Von Herff in his papers of 1896 and 1907 came very near solving the problem, just as in the case of placenta previa, by ascertaining that the fetal surface of the placenta had obtained its decidual covering by a process of cleavage of the decidua as the result of the growth and extension of the more peripheral chorionic villi. This was the more remarkable, as at the time his first paper was written we possessed no accurate knowledge of the implantation of the ovum nor of the formation of the various decidual layers.

10. This brings us to the consideration of the last and most important theory, which in a way constitutes a continuation of the small basic theory of Schatz and of the views of von Herff. That the abnormality is the result of an originally too scanty development of the chorion frondosum was first clearly expressed by Robert Meyer in 1909, and was advocated half-heartedly by Funck, Bertkau, Seitz, Grosser and others, and, as will be seen later, is the view which I advocate personally.

Early in the second week, the entire exterior of the ovum is covered by short relatively thick villi, which for a short time increase in size and complexity at approximately the same rate. Later, those in contact with the decidua capsularis cease to grow and soon undergo atrophic change—chorion laeve; while those in contact with the decidua basalis proliferate rapidly and give rise to the future fetal portion of the placenta—chorion frondosum. If for any reason, such as decidual abnormalities or defective energy on the part of the ovum, the chorion laeve becomes relatively too large and the chorion frondosum too small, the pregnancy will not necessarily come to an untimely end, but may continue to grow. In this event, the membranous area of the chorion frondosum can only very gradually increase, while, if the ovum is to survive, rapid proliferation of its villi is essential. This can be accomplished only by their growing longer and extending outwards in a more oblique direction. If this occurs, they will invade and undermine the decidua at their periphery, which will result in a virtual splitting of that membrane into two lamellae, one of which will contribute to the expansion of the basalis, while the other will persist as a covering layer for the extrachorionic portion of the placenta. In this way one can explain the eventual development of a placenta of the usual size, but with a small chorionic membrane, from whose margins the chorion laeve extends. As pregnancy advances, and more space is required for the growing ovum, the fetal membranes become bent backwards beyond the periphery of the chorionic plate, and thus come in contact with, but do not adhere to, the extrachorionic portion of the fetal surface of the placenta, while their folded inner margin forms the ring under discussion, which later may undergo degenerative or infarctive changes.

Beginning with Herff the majority of writers have asserted that the condition may give rise to serious clinical complications, such as

abortion, inexplicable uterine hemorrhage, premature labor, premature separation of the normally implanted placenta, and more particularly disturbances in the third stage of labor, such as imperfect separation of the placenta, retention of the membranes and postpartum hemorrhage with increased necessity for the employment of Credé's maneuver and manual removal. Others note the frequent association of the abnormality with the presence of placenta previa and cornual insertion. Such statements have been made by Herff, Sfameni, Funck, Bayer, Seitz and others, and Herff states that abnormalities of the third stage were noted in 39 per cent of his cases. Furthermore, certain writers claim that the condition is associated with a decrease in the weight of the children and with a diminution in the dimensions of the placenta, while others have directed attention to some increase in its thickness.

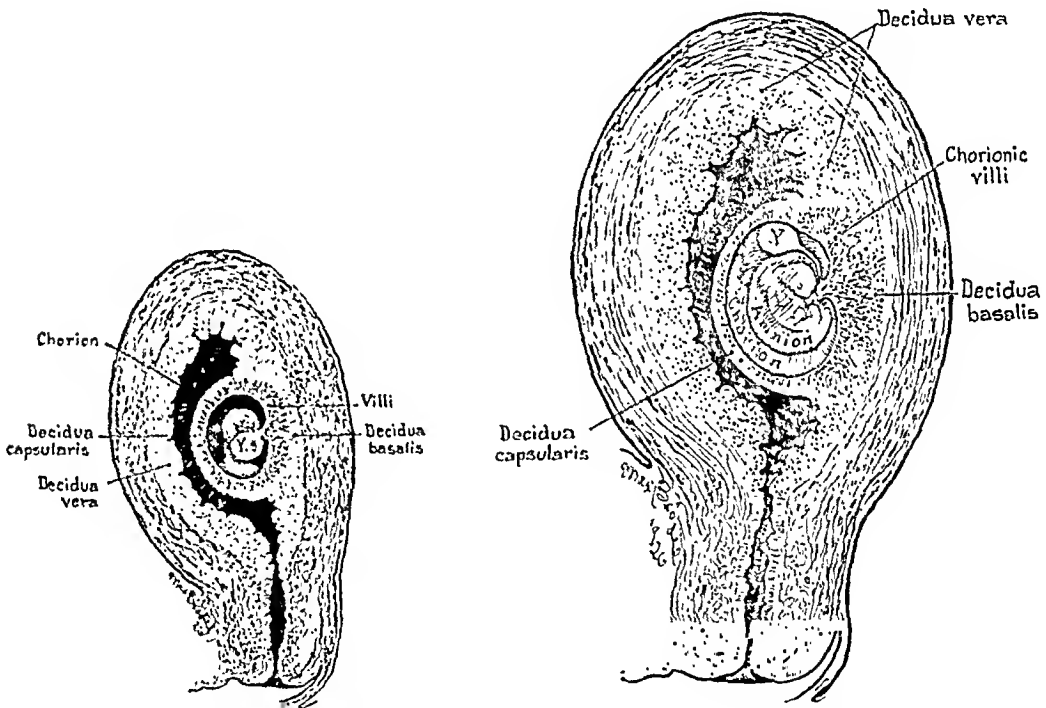


Fig. 4.—Diagram showing normal early pregnancy *in situ*—Chorion laeve and beginning frondosum.

Fig. 5.—Diagram showing more advanced pregnancy—Chorion laeve atropic, Chorion frondosum proliferating with its most laterally located villi invading the adjacent decidua.

I shall not enter into the details of this discussion, as such statements do not coincide with my experience; for, upon going over the clinical histories of patients presenting the abnormality, my impression is that it is practically without clinical significance and is to be regarded merely as an interesting anatomic condition. In none of our cases was it associated with abnormalities of the third stage of labor nor with premature separation of the placenta. Indeed, in my relatively large experience with the latter condition, in which the anatomic relations of the placentae were studied, I do not recall a single

instance of such an association, although I see no theoretic reason why it should not be occasionally noted. Likewise, I have not noticed any significant effect upon the size of the child nor upon that of the placenta, although it must be confessed that some are relatively thicker than usual.

On the other hand, I should hesitate to deny its occasional association with the production of abortion, although I have not as yet noted it. Various authors have directed attention to the similarity existing in the placental relations in so-called extramembranous pregnancy and the abnormality in question. I can neither affirm or deny it, as my

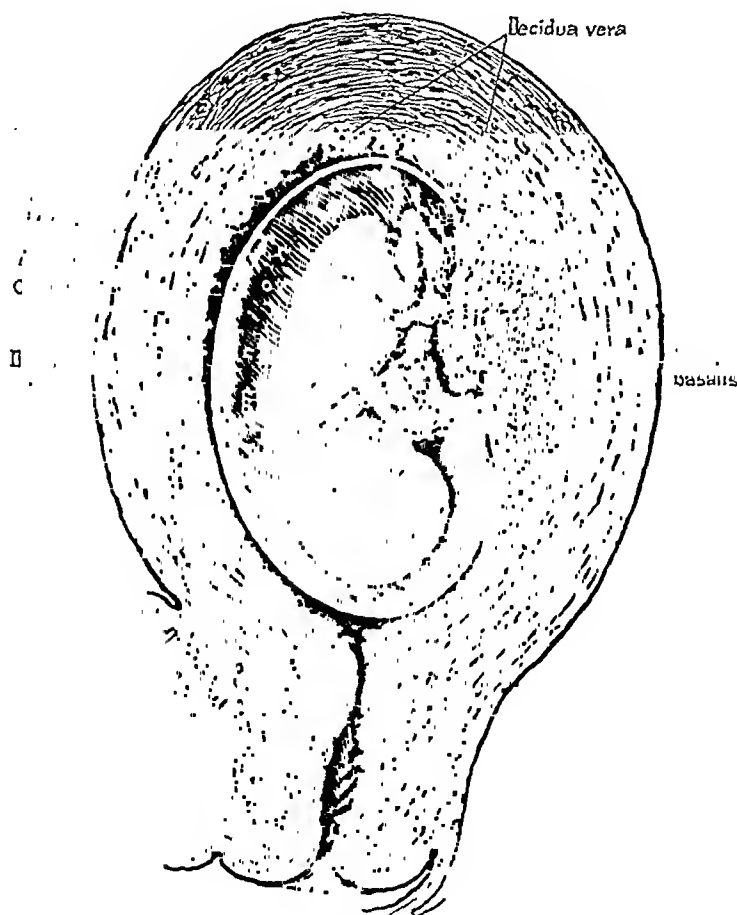


Fig. 6.—Diagram showing still more advanced pregnancy. Maternal surface of placenta in contact with decidua basalis. Fetal surface composed of central chorionic membrane and a peripheral extrachorionic zone covered by decidua. Fetal membranes reflected at margin of central portion giving rise to the circumvallate ring.

experience with the condition has been so scanty, that my opinion would be of no value.

Reverting to our own observations, it need only be said that consideration of the gross features of placenta circumvallata shows that we have to deal with a striking anatomic condition. Attention has been directed to the topography of the ring, to the restricted chorionic area, to the ease with which the membranes can be detached from the extrachorionic portion of the fetal aspect of the placenta, to the fact

that the latter is covered by a layer of decidua, and finally that the large fetal vessels do not extend over or into it, so that all that remains for consideration are my studies concerning the structure of the circumvallate ring, and its mode of production.

As has already been indicated the ring may vary greatly in gross appearance. In some specimens a true "annulus fibrosus" is present and presents a thick rounded inner border, so that it actually forms

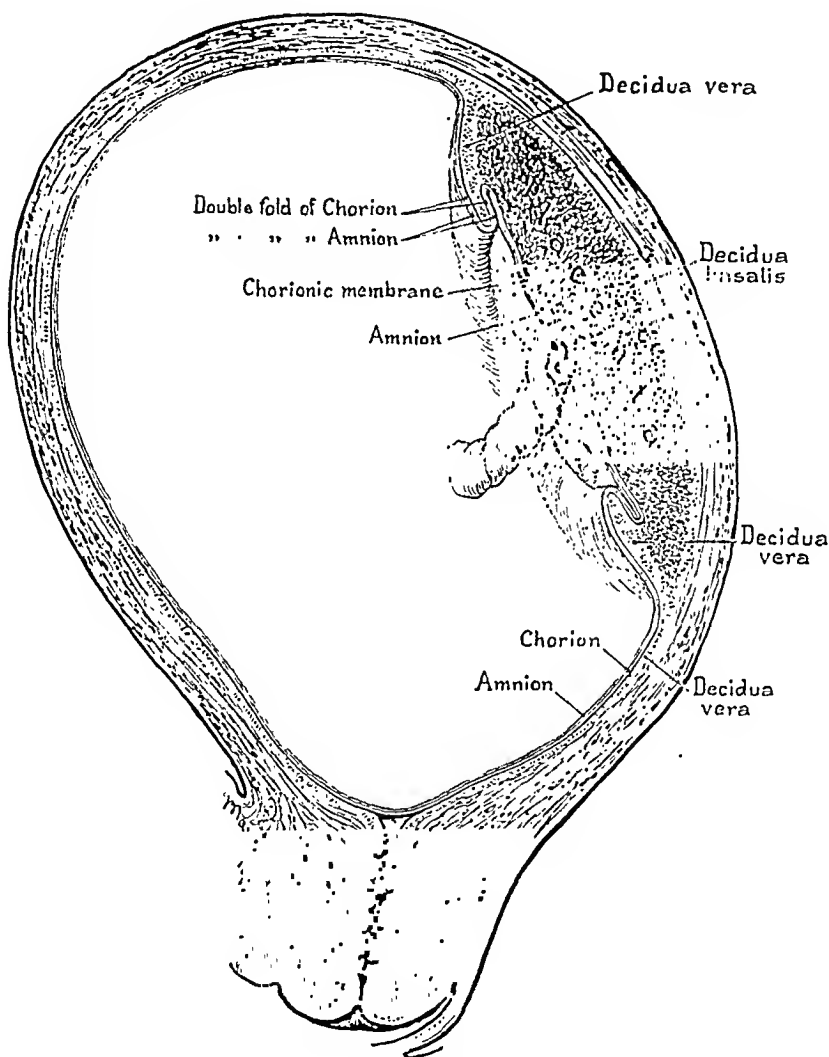


Fig. 7.—Diagram of uterus late in pregnancy, showing circumvallate placenta *in situ* with well developed "annulus." Note relations of chorionic membrane, extra-chorionic decidua, and duplicature of membranes.

a wall about the central chorionic area, which may lie several millimeters below the surface of the ring. In other specimens the ring is thinner, and in that event its inner margin appears to be undermined, and on cross section appears as a tongue-shaped process projecting over the chorionic area and separated from it by a slit-like space, as is shown in Fig. 7. The amnion covering the chorionic area is reflected over the ring, and at its outer margin becomes continuous with the

membranes lining the uterine cavity. In other specimens, the ring is still thinner and appears as a mere fold of membrane scarcely exceeding a millimeter in thickness.

In general, it may be said that such variations are dependent upon the extent to which infarction has occurred in the ring and in the adjoining tissues. When such changes are pronounced, the ring has a homogeneous whitish or yellowish color, but when they are absent it presents the bluish, white, translucent appearance characteristic of the normal fetal membranes.

The microscopic picture, likewise, varies with the degree of infarction. When slight or lacking, sections show that the ring is composed of folded fetal membranes, and the picture will vary according as the portion studied is obtained from its inner margin, or from a more peripheral portion. In the former location (Figs. 6 and 7), one sees from within outward, a layer of amnion, a layer of chorion laeve with its degenerated and atrophic villi, and beneath it a very thin layer of decidual tissue corresponding to the capsularis. Beneath the latter come the same three layers in reverse order; decidua capsularis, chorion laeve, and amnion. Then follows a small space, and beneath it a third layer of amnion resting upon the chorionic membrane. It should be remembered that conditions must be especially favorable in order for one to make out the two thin layers of decidua capsularis, as in most specimens they have fused into a single layer.

In any event, the microscopic findings are usually sufficiently comprehensive to enable one to conclude that the ring has resulted from a folding or duplication of the fetal membranes at the margin of the chorionic membrane. Peripheral to the ring the picture is radically different, as we then have to deal with only a single layer of membranes, consisting of amnion, chorion laeve and decidua capsularis, beneath which may be a narrow space, bounded on its other side by the layer of decidua covering the extrachorionic portion of the fetal aspect of the placenta, with which the chorionic villi are in immediate contact without the interposition of a chorionic membrane. Again, it should be remembered that especially favorable conditions must obtain if such a picture is secured, as the decidua capsularis and the placental decidua tend to coalesce and to appear as a single layer.

On the other hand, if infarctive changes have developed (and this is the rule on account of defective vascularization), an "annulus fibrosus" is produced and the fundamental relations become greatly obscured, with the result that in many specimens the amniotic epithelium is the only definitely characteristic tissue distinguishable, while the rest of the ring is made up of fibrinoid and of remnants of villi which have undergone fibrinoid or hyaline degeneration. But even in such specimens it is usually possible to discover a clue to the process, for on approaching the periphery of the placenta, the normal fetal membranes,

plus decidua capsularis, will be found in contact with, but not united to, the decidua covering the peripheral portion of the fetal surface of the placenta.

In the extruded placenta, the latter decidual layer can be followed to the margin of the organ, where it becomes continuous with the decidua basalis covering its maternal aspect. I consider it unprofitable to employ a special designation for the former, as it is a matter of indifference whether it is designated as vera or basalis; although strictly speaking, any part of the decidua to which functioning villi are attached could appropriately be designated by the latter term. For these reasons, I see no advantage in employing the term *serotina marginalis* as suggested by Funek, more particularly as the word *serotina* is becoming obsolete.

From what has already been said, it is clear that I agree with Meyer that the process is not necessarily associated with infarction, so that the presence of an "annulus fibrosus" should be regarded as a secondary phenomenon, and I hold that the essence of the abnormality lies in the restricted area of the chorionic plate, the folding of the membranes and the presence of a layer of decidua upon the extrachorionic portion of the fetal surface of the placenta.

How is this brought about? As the abnormality is associated with fundamental variations in the structure of the organ, it is apparent that it must originate in the early stages of placentation, that is, during the very first weeks of pregnancy. Unfortunately, however, I have not encountered it in any of the specimens of early pregnancy which I have studied. Consequently, whatever I may say must be regarded as inferential, instead of being based upon actual observations. Earlier in the paper, under heading 10, I stated that I believed that the abnormality resulted from a primary limitation in the extent of the chorion frondosum, with the result that if further development of the pregnancy was to occur it would be necessary for the villi at the periphery of the developing placenta to proliferate obliquely outward, and, in so doing, to undermine the adjacent decidua. Figs. 4, 5, and 6 afford a diagrammatic illustration of what I believe occurs. Fig. 4 represents a normal early pregnancy in which the chorion frondosum is just beginning to be differentiated from the chorion laeve. Furthermore, Fig. 5 represents a pregnancy in a slightly more advanced stage of development. In it the chorion laeve has already undergone atrophic changes, while the frondosum has proliferated to form the fetal portion of the placenta. In the drawing it has been attempted to indicate that, as the result of its restriction in area, the peripheral villi of the frondosum are extending more obliquely outward than usual and are invading and splitting the adjacent decidua.

Fig. 6 illustrates a somewhat more advanced stage of pregnancy, and shows, as the result of the peripheral proliferation of the chorionic villi, that the decidua has been split in such a way that while the decidua basalis is present as usual, abnormal conditions prevail at the margin of the placenta, as well as upon its fetal surface. Here it is seen that the decidua capsularis does not extend from the margin of the organ as usual to form the outermost layer of the fetal mem-

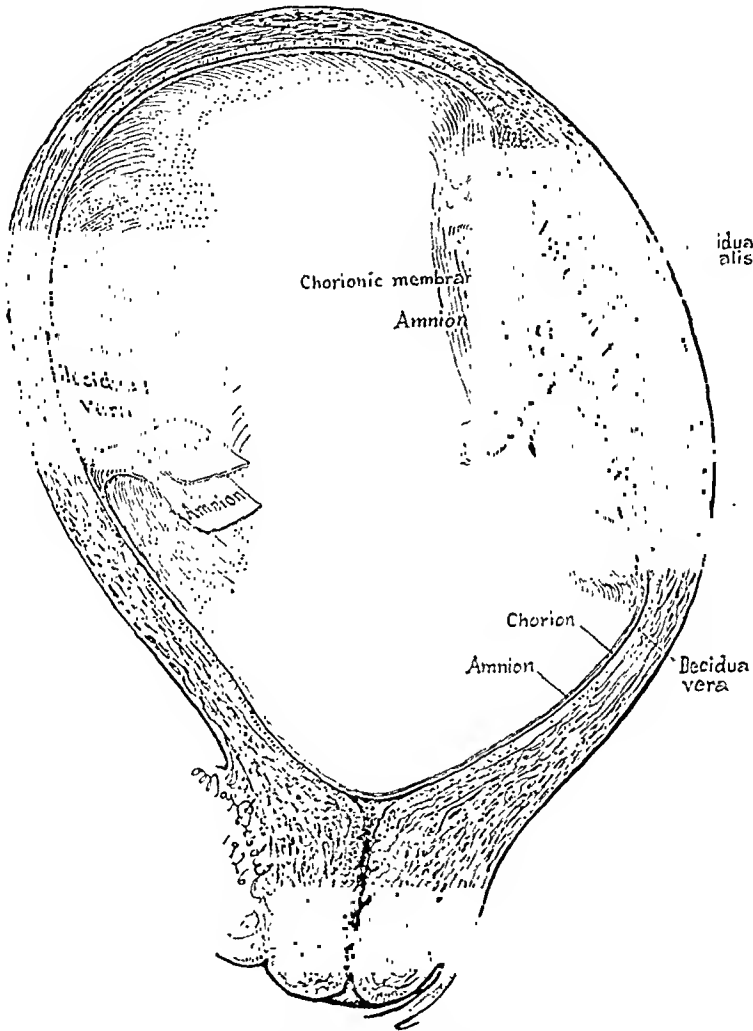


Fig. 8.—Diagram of uterus late in pregnancy, showing normal placenta *in situ*. Compare with Fig. 7, and note that chorionic membrane covers entire fetal surface, and that the membranes pass from the margin of the placenta to the uterine walls.

branes, but, that a layer of decidua covers a considerable part of the peripheral portion of the fetal surface of the placenta, while the chorionic membrane has become restricted in area, instead of covering the entire fetal surface.

It is apparent, so long as the embryo remains small, that the membranes will extend from the periphery of the restricted chorionic membrane, but as soon as greater space is required for the product of conception, and the extrachorionic portion of the placenta has in-

creased in size, the membranes must become folded upwards and outwards over the periphery of the chorionic membrane and that their outer covering of decidua capsularis will come to lie upon the layer of decidua covering the extrachorionic portion of the placenta.

Such a mechanism offers a satisfactory explanation for the folded margin of the ring, as well as for the other salient features of abnormality, and Fig. 7 gives a diagrammatic representation of the condition of affairs later in pregnancy; while Fig. 8 affords a means of comparing them with those obtaining under normal conditions.

Except for the infarctive changes noted in many specimens, I have been unable to detect any essential variations in the histologic structure of placenta circumvallata. That being the case, I have not been able to confirm the statement of Funck that the villi are generally larger and less abundant than in the normal organ.

Reference has already been made to the belief of many writers that placenta circumvallata predisposes to the production of various clinical abnormalities, and a few words will suffice to make my position clear. It is stated that it tends to be smaller in circumference and greater in thickness than the normal placenta, but, as my observations do not bear out such a contention, I believe that the variations occurring are well within the normal limits. Likewise, nothing that I have seen indicates that the abnormality exerts any effect upon the development or weight of the child. Naturally, extensive statistical study would be necessary to establish such a relationship, and the figures thus far available are far too few to permit any justifiable conclusion. Of one thing, however, I am sure, and that is that the condition does not predispose toward abnormalities of the third stage of labor, which in my experience has been as normal as under other circumstances. For this reason, I am at a loss to understand Herff's statement that 39 per cent of all patients in which expression of the placenta was required presented marginate or circumvallate placentae.

Finally, I may say that although in our experience placenta circumvallata possesses no clinical significance, it must nevertheless be regarded as a striking anatomic abnormality, which is of interest because it is associated with fundamental variations in the development of the organ, and that a satisfactory explanation for its genesis could scarcely be expected until our notions concerning the mechanisms involved in normal placentation had become established upon a firm foundation.

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JOHNS HOPKINS HOSPITAL.

## TWO RARE OVARIAN TUMORS

### ADENOFIBROMA, AND DERMOID CYST ASSOCIATED WITH MULTIPLE OVARIAN FIBROMATA

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#### I

**A**DENOFIBROMATA are complex tumors of benign type, in which epithelial and stromal elements simultaneously multiply. In the ovary their origin may be considered under the following groups:

1. From residual embryonal elements. In the adult ovary rete tubules are not infrequently encountered in the hilum, particularly near the cephalic end of the gland. In embryonal life sprouts from the rete cords unite with the medullary cords of the ovary and the mesonephric tubules. Lumina appear early and are lined with irregular epithelium. From this stage they regress and as a rule disappear. According to Bailey and Miller, the former view, that these tubules were of mesonephric origin, has been discarded. Newer investigation has conclusively demonstrated that they are derived from the germinal epithelium and unite with the wolffian gland tubules secondarily. Adler, in a demonstration of cases, reports an adenofibroma in the medullary portion of the ovary, which he ascribes to these tubules and their surrounding stroma.

2. From the aberrant wolffian duct tubules. The various types of endometrial glandular elements found in the ovary were previously ascribed to heterotopia of these tubules. The condition was first described by Piek and designated as adenoma endometrioides ovarii.

Since their rediscovery by Sampson and the exhaustive work that has followed, this opinion has lost ground. Sampson ascribes the aberrant tubules in the cortex of the ovary as implants from the uterine endometrium. The German school (Robert Meyer) believes the origin to be from the surface germinal epithelium. Stromal proliferation about the tubules is not constant. When found it resembles embryonal spindle-cell stroma of the uterine endometrium. The glands and stroma participate in menstrual reaction as evidenced by bleeding into the stroma and gland lumina. At times large hemorrhagic cysts of similar origin are encountered in the ovary. Origin of compound tumors from this tissue is not likely for essentially the process is one of regression. In the uterus and tubes, invasion of the wall by müllerian epithelium produces local or diffuse adenomyomata and endometrial stroma may or may not surround the glands. By analogy similar tumors may arise in the ovary though none have been thus interpreted to date.

3. From the constituent portions of the normal gland (organoid). In the ovary tumors derived from the germinal epithelium reproduce simple or papillary cystadenomata. The stroma like in all adenomatoid conditions proliferates to some degree, but epithelial elements and cystic change predominate. These tumors can therefore be excluded as a source in the formation of fibroadenomata. Desmoid tumors also occur in the ovary either as diffuse fibromata of the entire organ or circumscribed nodules in the cortex. These bulge beyond the surface and by pressure cause hyperplasia of the overlying germinal epithelium. These hyperplastic conditions have been found in five circumscribed fibromata observed in the last two years. True adenofibroma represents a further step in the proliferation of germinal epithelium. The initial stimulus is the underlying fibroma with secondary invasion by hyperplastic epithelial elements from the germinal layer, resulting in the formation of an adenofibroma.

These tumors are relatively rare. Pfannenstiel illustrates such a tumor in Veit's *Handbuch der Gynäkologie*. Orthman, and Amann report adenocarcinomata as secondary degeneration in primary benign adenofibroma.

The following case report is of interest for it shows tumor formation of desmoid elements in the uterus and left ovary. The latter displays circumscribed cortical fibromata and a cortical adenofibroma.

The clinical features and pathologic findings are as follows:

CASE 1.—Mrs. R. R., aged forty-seven, was admitted to the service of Doctor Polak at the Long Island College Hospital, March 19, 1926, complaining of vaginal bleeding and pain in the lower abdomen. Menstruation began at fourteen, recurred every twenty-five days and was of five days' duration with profuse flow. Last menses were February 17, 1926. Patient has been married twenty-five years and had four full-term living children with normal labor.

On February 25, eight days after her last period, patient began to stain, passing clots and brownish material. This was associated with cramp-like pains in the lower abdomen. These symptoms persisted to the date of admission.

The abdomen presented a central tumor which was smooth, sharply defined and tender, arising from the pelvis and reaching within three centimeters of the umbilicus. Pelvic examination showed a lacerated pelvic floor with a moderate cystocele. The cervix was open. The uterus was enlarged to the size of a four months' pregnancy and filled the pelvis. Parametria were insensitive.

Blood Hb. was 43 per cent; W. B. C., 12,900; neutrophiles, 78 per cent; blood pressure, 142/86; phthalein, 35 per cent in two hours, and urine showed a trace of albumin and an occasional granular cast.

On March 25, 1926, supracervical hysterectomy and bilateral salpingo-oophorectomy were performed. The uterus contained a large solitary fibroid in the posterior wall.

The uterus was enlarged as a result of a solitary interstitial fibroid occupying the entire posterior wall and compressing the uterine cavity. The latter was lined by an interval mucosa except over the tumor where it displayed atrophy. On section the

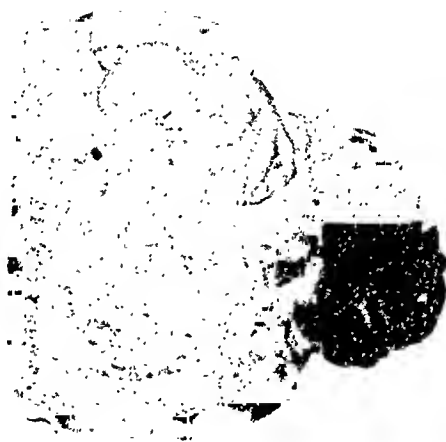


Fig. 1.—Gross specimen of adenofibroma of the ovary. Note the circumscribed kidney-shaped mass projecting beyond the cortex. The dilated gland spaces are recognizable.

tumor was soft, salmon colored, and presented diffuse thrombosis of the capsular and intratumoral veins. The tubes were grossly normal in form, shape and contour.

The right ovary was crescentic and measured 38x28x10 mm. The surface was smooth and grey; consistency was firm with an occasional follicular cyst presented beyond the surface.

The left ovary was heart-shaped and measured 36x30x10 mm. The medial surface presented two minute cortical fibromata averaging 4 and 5 mm. in size respectively. A larger ovoid mass presented from the free convex border measured 25x15x10 mm. On section it was compact except for minute cystic spaces, irregularly distributed between the component whorls of fibrous tissue, barely visible with the naked eye. Near the surface several hemorrhagic areas were also evident. The remainder of the ovary displayed sclerosis of the cortex and medulla. The former contained moderate numbers of follicular cysts. Vessels in the hilum were prominent.

Microscopic study of the left ovary showed the germinal layer well preserved; tunica and cortex moderately sclerotic. The minute cortical fibromata were comprised of fibrous cells with abundant intercellular collagen, and lined by three to four layers of low cuboidal epithelial cells derived from the germinal layer. The larger tumor showed whorls of fibroblasts with dense deposits of collagen between the intertwining cells. The nuclear elements were few. Scattered throughout, but

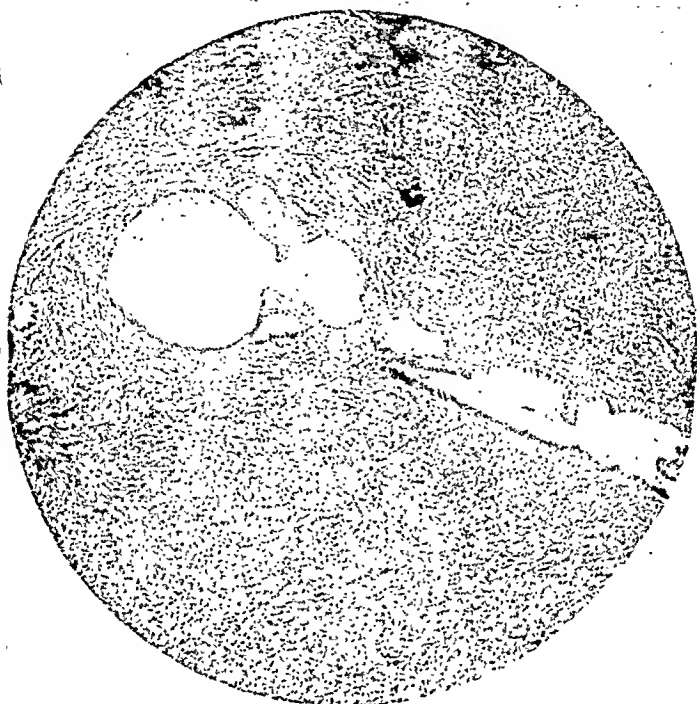


Fig. 2.—Glands of varying size supported by proliferating fibroblasts of the mixed tumor in adenofibroma.

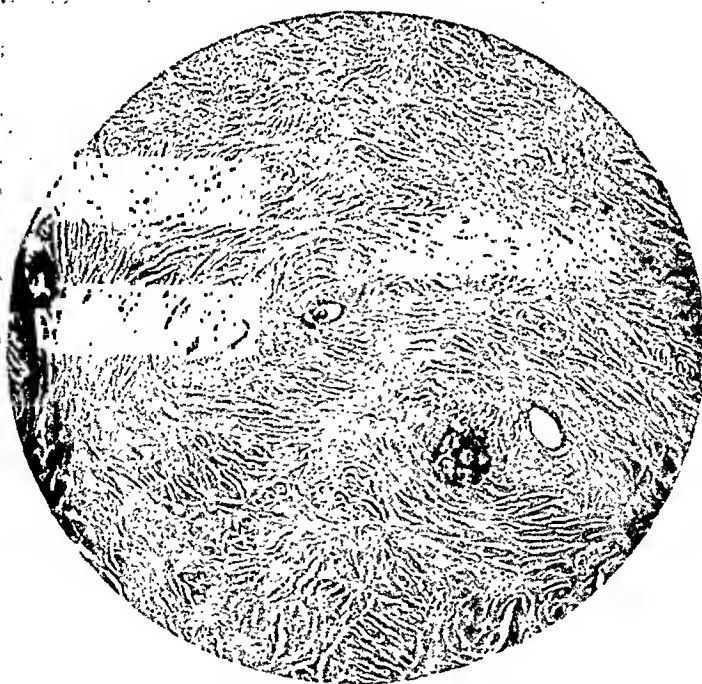


Fig. 3.—Gland spaces enclosed in interlacing whorls of hyaline connective tissue. The calcified cells of one gland fill the lumen forming a psammoma body.

more prominent near the surface were gland spaces of varying size and contour, the majority round or oval, but large dilated forms were also encountered. The lining cells presented varying morphology, some low and cuboidal as they appear in normal germinal epithelium. Other glands were lined by cells which were definitely columnar and ciliated. Some glands showed calcareous degeneration of the lining cells which had desquamated into the lumen so that the gland presented an irregular blue body (psammoma bodies). The vascular supply was furnished by moderate numbers of medium sized capillaries. At all points the tumor was sharply defined from the cortex. The remainder of the organ displayed interstitial sclerosis with follicular cysts in the cortex. Corpora albicantia were occasionally seen in the medulla. Vessels show subinvolution sclerosis.



Fig. 4.—Gross specimen of dermoid cyst in association with multiple ovarian fibromata. The central locule shows the hairs proceeding from the dermoid anlage. The upper and lower locules are solid and show the fibrous structure and interlacing fasciculi. The irregular cavities demonstrate focal necrosis of the tumors.

## II

Dermoids are benign teratoid tumors of the ovary characterized by semisolid consistency due to contained hair and sebum. The size increases with the quantity of retained secretion. A typical *anlage* is constantly found on the interior of the cyst. It contains skin, hair, sebaceous and sweat glands as ectodermal derivatives. Fat, muscle, bone and teeth are frequently encountered and are of mesodermal origin. Entodermal elements as a rule are lacking.

The association of dermoids with other tumors has been repeatedly noted. Pseudomucinous cystadenoma has been most frequently encountered. Simple serous cysts, or follicular cysts have been found.

This case is unique in the association of multiple fibromata with the dermoid. The fibroids too are unusual because of their multiplicity and their large size. Usually ovarian fibromata occur as small papillary cortical tumors projecting from the surface, or as solitary tumors diffusely involving the entire organ. In this specimen two large circumscribed fibromata surround the central dermoid cavity.

CASE 2.—Mrs. L. S., aged fifty-four years was admitted to Doctor Polak's service at the Long Island College Hospital on February 28, 1926, complaining of weakness, frequent urination and an abdominal tumor mass. Her menstruation began when she was fourteen years old and recurred regularly every twenty-eight days and lasted for five or six days. Patient was married thirty-four years and had three normal children with spontaneous labors.

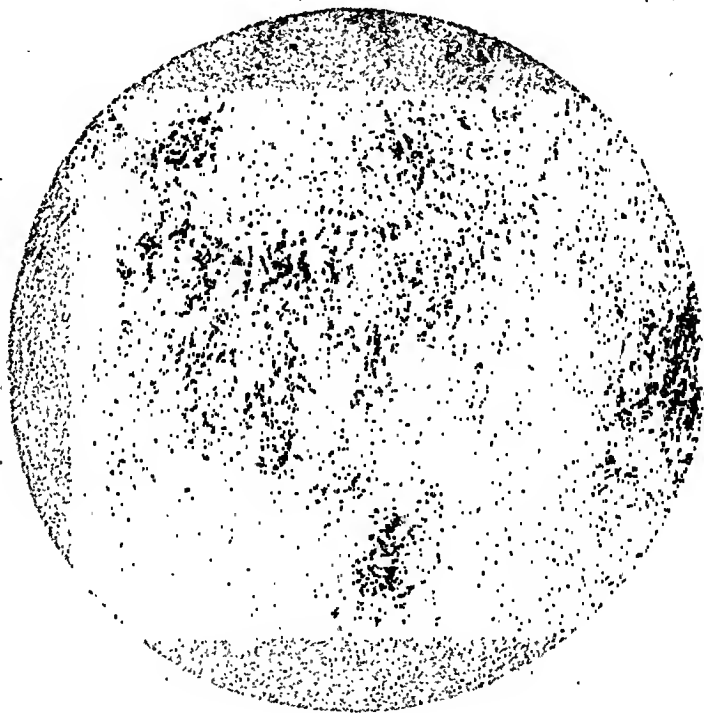


Fig. 5.—Broad sheets of proliferating fibroblasts comprising the solid locules of the tumor. The pale areas represent edema.

Five years ago the patient noticed a mass in the lower abdomen about the size of an orange, which continued to grow to the size of a fetal head. Now two additional tumors are present. In the past year patient has had marked weakness and impairment of vision.

The eye grounds showed sclerosis and tortuous vessels; the retinae, areas of degeneration and subhyaloid hemorrhage in the regions of the maculae. The heart showed hypertrophy of the left chamber, mitral regurgitation and a roughening of the first sound over the aortic valve. The lower half of the abdomen was irregularly distended by multiple firm tumors reaching from the pelvis. Pelvic examination showed a senile marital introitus. Vagina was short and compressed by irregular tumor masses which were firm and insensitive, filling the pelvis.

Urine showed an occasional hyaline cast. Blood pressure was 248/126 and blood chemistry, normal. Blood count: R. B. C. 4,360,000, Hb. 85 per cent, W. B. C. 7,300, neutrophils 61 per cent.

After two weeks' rest, laparotomy was performed under local and gas oxygen anesthesia. The uterus was carried upward by a large solid tumor of the left ovary which was incarcerated in the pelvis. The uterus itself contained multiple fibroids. Free fluid was present in the abdominal cavity. Supracervical hysterectomy and bilateral salpingo-oophorectomy were performed. Convalescence was uneventful.

The uterus showed multiple fibroids of the subperitoneal, interstitial, and submucous types.

The left tube was definitely elongated and measured 150x8 mm. It was grossly free from all other pathologic changes.

The ovary was attached by a long pedicle (12 cm.) to the outer aspect of the broad ligament, tremendously enlarged and converted into a multilobular mass, measuring 17x30x10 cm. The largest lobule was reniform and measured 17x10 cm. Externally it presented several cystic spaces bulging beyond the surface, which were

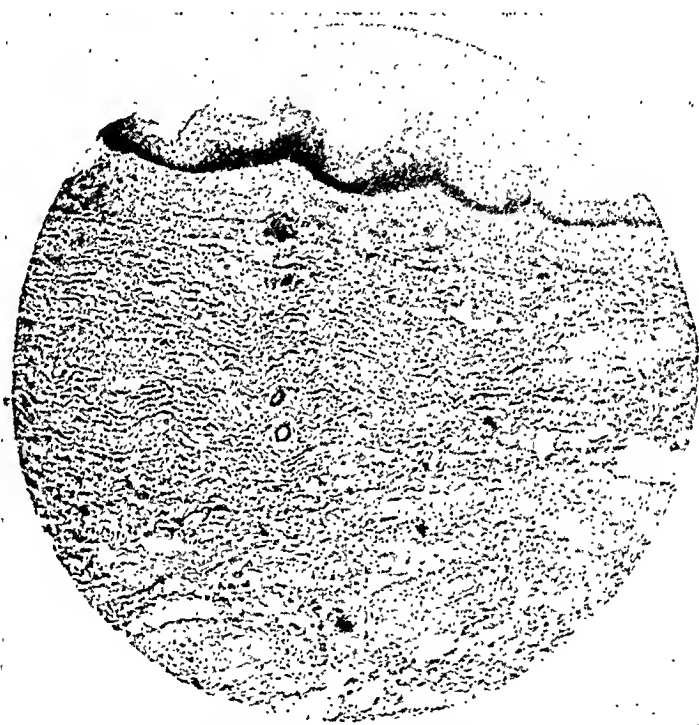


Fig. 6.—The lining of the dermoid locule is formed by epidermoid epithelium thrown into shallow waves. The corium is sclerotic. More deeply, several columns of muscle are recognizable.

reddish, translucent and averaged 4 cm. in size. The remainder was grey-white in color and the underlying veins coursed in shallow furrows. On section this lobule was comprised of edematous interlacing fibrous whorls, with foci of liquefaction necrosis. In the upper pole, a series of hemorrhagic spaces formed by trabeculae of fibrous tissue was present, varying from 2 to 12 mm. in size. The hemorrhagic zone measured 7.5x2.5 cm. Proceeding from the lower pole of the main lobule, was a second lobule, ovoid in shape and semisolid in consistency, 9 cm. in diameter, and filled with sebum and hair. The dermoid anlage was not pronounced. The wall of the cavity was covered by smooth thin epithelial lining. The third lobule was superimposed on the dermoid, and measured 7x3.5 cm. It presented several hemorrhagic spaces bulging beyond the surface. On section it was more homogeneous than the main tumor and comprised of finer fibrillae. The hemorrhagic surface cyst is found on section to be comprised of hemorrhagic cavities as noted in the larger lobule.

Multiple sections through both solid tumor lobules displayed essentially similar changes. The composite cell is a fibroblast coursing in large broad irregular whorls which interlace in all patterns. The large deposits of hyaline obscured the cell contour but the irregular spindle nucleus was typical. Where edema was present the extracellular products were pale and the cells spider or fusiform in shape, simulating myxomatous tissue. Such zones were more frequently encountered in the larger tumor. The hemorrhagic areas grossly noted were irregular masses of cell débris. Recent interstitial hemorrhage was present.

The dermoid locule presented in the sections studied a zone of epidermoid epithelium of the adult type. The corium was present as a broad zone of hyaline connective tissue. Sebaceous glands, hair follicles and an occasional sweat gland were encountered. A layer of muscle lay more deeply in the wall.

#### SUMMARY

The enclosed case reports present the clinical and pathologic aspects of adenofibroma of the ovary and combined multiple fibromata and dermoid respectively. Both were associated with fibroid tumors of the uterus. Their rarity warrants the detailed description given above.

My thanks are expressed to Drs. J. O. Polak and Archibald Murray for their suggestions in the preparation of this report.

1530 PRESIDENT STREET.

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## REPORT OF A CASE OF INTERSTITIAL PREGNANCY WITH WELL PRESERVED FETAL CAVITY\*

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SINCE the occurrence of a pregnancy in the interstitial portion of the fallopian tube is relatively infrequent, and as the fetal cavity is generally less well preserved than in the present case, it seems worth while to record the following history, with a description and photographs of the specimen removed at operation.

The patient, a white woman, thirty-two years of age, was admitted to the New Haven Hospital, January 9, 1926. The first and second labors terminated spontaneously, but the last pregnancy in 1919 ended in a spontaneous abortion at the fifth month. The menstrual flow began at fifteen years of age, recurred every 28 to 35 days, without pain, and lasted from 5 to 6 days. The last regular period ended early in November. Uterine bleeding recurred from December 1 to 10, but the patient failed to attach any importance to the relatively prolonged flow.

At 1:30 P.M. on the day of admission, she noticed "black specks before her eyes," which were accompanied by a few dull, aching pains in the lower abdomen. Almost immediately these dull pains were replaced by a sharp pain, which was localized in the right side. At this time, the patient fainted. Upon recovering consciousness a few minutes later, she found herself lying on the floor. A physician who was summoned administered a drug, subsequent to which nausea and vomiting

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occurred. Since these symptoms were followed by difficulty in breathing, thirst, and abdominal pain aggravated by the pressure of clothing, entrance into the hospital was advised. During the first part of the trip from her home (a distance totalling twenty-one miles), she "did not seem to be aware of what was going on."

Upon admission, examination showed a fairly well nourished white woman. The skin and mucous membranes were notably pale; the extremities were cold and clammy; the radial pulse was absent; the temporal pulse, of poor quality, was 136; the systolic blood pressure was 60 mm. Breathing was irregular and shallow. The abdomen was distended; the flanks were bulging; discoloration in the vicinity of the umbilicus was absent; a fluid wave could be elicited, and upon palpation there was generalized tenderness. The pelvic examination failed to reveal external bleeding. The cervix was softened and, upon moving it, the patient complained of pain. The culdesac was bulging and crepitation could be demonstrated. Palpation of the uterus—enlarged to the size of a small grapefruit—revealed a protuberance at the right cornu. The adnexa could not be outlined. The blood count showed R. B. C. 3,072,000, W. B. C. 15,800, Hb. 55 per cent. A diagnosis was made of a ruptured ectopic pregnancy, probably associated with a uterine myoma.

As the abdomen was opened, the blue of the abdominal contents was seen through the peritoneum. The cavity contained approximately 1000 c.c. of fluid and clotted blood. The adnexa was normal, the left ovary containing the corpus luteum of pregnancy. The uterus was enlarged, the right cornu being occupied by a protuberance 7 cm. in diameter. Upon the posterior surface of the latter, there was a bleeding area 1 cm. in diameter, through which protruded placental tissue. A similar area was present upon the posterior surface of the right broad ligament. A supravaginal hysterectomy and right salpingo-oophorectomy were performed. Five hundred c.c. of saline solution were poured into the peritoneal cavity and the abdominal wall closed in layers. The anesthetic, ethylene, was taken badly, and oxygen was administered toward the close of the operation. The patient received a transfusion of 500 c.c. of blood, but since the radial pulse was still absent, and the systolic pressure failed to rise appreciably above 60 mm. a hypodermoclysis of 1500 c.c. of saline, and caffeine by rectum, were administered. Convalescence was satisfactory until the fourteenth day, when an infection developing at the upper end of the incision necessitated drainage and irrigation. Granulation proceeded slowly and the patient was confined in the hospital until the thirty-fifth day.

The right cornu of the uterus was occupied by a fluctuant protuberance measuring  $7.5 \times 7.5 \times 8$  cm., which was continuous laterally with the right tube. The ovarian ligament was attached to the lower posterior surface of the protuberance. Over the anterolateral surface and in the vicinity of the right cornu, were numerous distended blood vessels. Upon palpation, the wall of the cystic structure was very thin and just posterior to the point of entrance of the tube, there was distinct bulging. Upon the posterior wall there were two openings, one 0.1 cm., and the second 0.8 cm. in diameter, through which projected chorion and placental tissue.

Following fixation in formalin, the specimen was sectioned transversely. The uterine cavity measured 5.5 cm. in length and contained a large amount of soft, grayish-white tissue resembling decidua. The left wall measured 2 to 2.5 cm. in thickness, while the right varied between 1.75 cm. and 2 cm. in thickness. The fetal cavity contained a well preserved male fetus, whose crown rump measurement was 7 cm. The placenta was attached to the lateral uterine wall and to the posterior wall of the fetal cavity. The umbilical cord was 7 cm. in length and showed no abnormalities. Fibers of uterine muscle could be seen extending up over the top of the fetal cavity, but none were discernible upon the right side. The upper wall of the cavity varied from 2 to 3 mm. in thickness, while the lateral wall was 1 mm. or less in thickness. The lumen of the right tube could be readily seen for a distance of 1.5 cm. from the uterine cavity. (Fig. 1.)

For microscopic study, sections were taken through the tube distal to the fetal cavity, the thinned-out wall of the fetal cavity, and the uterus. The lumen of the tube was patent and free from evidences of infection. The mucosal folds were free, the surface epithelium well preserved and normal, and there was no infiltration of the underlying connective tissue.



Fig. 1.—Transverse section showing fetal and uterine cavities.

The thinned wall of the fetal sac showed some edema. The muscle fibers were poorly preserved and almost the entire thickness of the wall consisted of connective tissue. This condition was particularly marked near the point of rupture.

Sections through the uterus showed that the endometrium had been converted into a structure similar to that found in cases of intrauterine pregnancy, although the spongy layer was less well developed than in the latter condition.

## VISCERAL MANIKINS IN CARVED IVORY

BY LE ROY CRUMMER, M.D., OMAHA, NEBRASKA

THE recent communication of C. S. J. Thompson,\* "Anatomic Manikins," deals with plastic representation of anatomic detail in a medium previously unrecorded in the literature.

Practically all of our knowledge of the development of anatomy, or may I say, our understanding of the penetration of the knowledge of anatomic details in the life of the people, is dependent upon the survival of plastic models fully as much as upon records left in manuscript or drawing. Attempts at proper anatomic illustration followed soon after the invention of printing, but the crude early cuts were in the main efforts to make drawings from the descriptions in the text of classic authors suitable to illustrate the context. While some earlier attempts were made, notably by Berengarius and Dryander, it was only with Vesalius that accurate drawing based directly on models became a feature of anatomic illustration. Even Vesalius recognized the objection to illustration in only two dimensions, and in the *Epitome* had his figures drawn to scale so that the separate parts might be cut out and superimposed, a method which he undoubtedly learned from the many series of fugitive sheets with superimposed flaps, which antedated his publication some five years. The devotion to dissection of the great artists of the Renaissance indicated a desire to study form so that they might achieve perfection in painting, and with many of them, the course of endeavor was from the dissection through some form of plastic expression to the ultimate graphic representation of the human form. In Da Vinci's wonderful drawings, the effort to correctly depict the form is equal to his ability to show anatomic detail.

It is too long a story to trace the efforts made from Santorino to Fischer to substitute plastic models for charts, but each attempt is evidence of a constantly recurring desire to produce designs more suitable for purposes of instruction than could be possible with the best productions of the graphic arts. The papier-maché models of the anatomic lecture room and the jointed doll of the art class are the attenuated evidence of this fundamental idea.

Practically every form of plastic art has been used to depict anatomic detail, and almost every material has been utilized to form anatomic models, but Thompson's description of models carved in ivory is sufficient to arouse interest and warrant the description of similar figures.

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\*Journal of Anatomy. 1925, lxx, Part 4.

Even before Thompson's article appeared, I had carefully studied the figures in the Welcome Museum, and determined, if possible, to secure one of them. I realized their extreme rarity, but felt that at least, I had one more object of medical historic interest to look for. For two vacations I kept up the quest unrewarded, but one morning I visited an antique dealer at Bale, and was delighted to be offered a copy of the 1575 Bauman Vesalius in the original binding and in perfect condition. The dealer also had a few things of historic interest in pewter, and, as was my habit, I asked him about ivory figures. Much to my surprise, he said he had a pair somewhere in the shop;

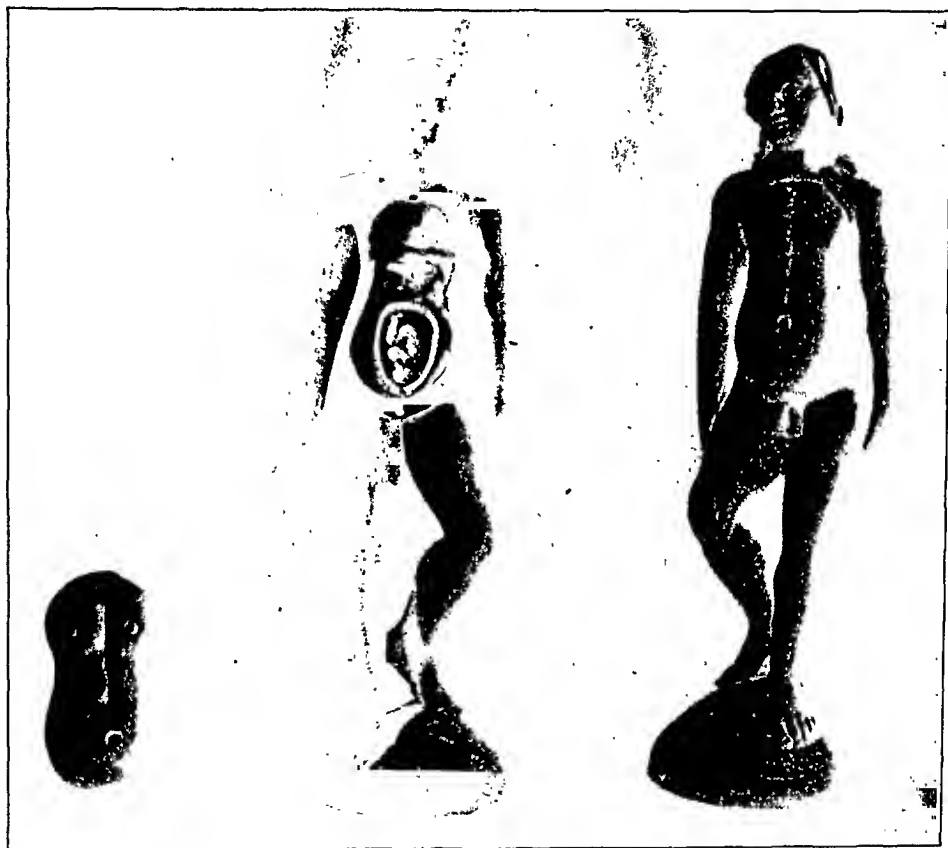


Fig. 1.—Ivory manikins 17th century. Italian workmanship.

he and his wife then began to ransack the numerous drawers in the old furniture which filled the rooms. Finally, he gave up the search, but assured me that if I would return at two o'clock, he would have the figures for my inspection. I have never been able to decide whether his search was a mere bluff because he had to send out for the figures, or whether he feared his sacred lunch hour would be disturbed. At any rate, I returned to the hotel with what patience I could muster. Just at this time, one of those sudden overwhelming thunderstorms came up which lasted until within a few minutes of my two o'clock appointment. I went back to the door of the shop, which had been flooded during the storm; the dealer, standing on a

box in the middle of the room, greeted me with a smile and handed me two ivory figures. A glance disclosed that they were different from those in the Welcome collection, and after the proper amount of bargaining, they were mine.

A careful examination showed that these figures were much more beautiful and of better craftsmanship than any in the Welcome collection. Instead of being prone, each of the figures stands erect upon a hemispheric base well carved from a single piece of ivory; each is approximately 16 cm. high; the features are finely cut; the eyes are open and the hair is brushed back from the forehead. All of the finer surface details are well carried out; there is a pleasant contrast between the rotundity of the female and the well-marked musculature of the male. The arms are not jointed as are those in the models in the Welcome collection, but extend gracefully down the sides below the hips in quite normal proportion. The figures have been carved entire and afterwards the anterior aspect of thorax and abdomen has been sawed off so that the detail carving of the viscera could be done. This carving has been carefully executed from the same piece of ivory, and in fact, some of the organs have been carved *in situ*. This method of carving was fortunate since in the course of time many of the parts not firmly attached have been lost.

In the male figure, there is a groove indicating the position of the diaphragm and above this groove is the spherical heart attached by a small piece of tape to the upper portion of the thorax. Below the groove is the spleen and both kidneys with blood vessels and ureters. Quite out of proportion is an immense bladder with wings. All of these organs except the heart have been carved in position and are attached to the posterior wall of the abdomen. The vena cava is represented by a strand of some dark material in proper anatomic position.

In the female figure, there is also a groove for the diaphragm, but the heart as well as the lungs is missing. Below the groove is a retort-shaped stomach, kidneys, and spleen with the proper blood vessels. The uterus is shown enlarged halfway from the umbilicus to the ensiform cartilage. The fetus is freely movable and is a piece of most delicate carving; a piece of red silk thread serves as the cord and connects the fetus with the placenta which is located in the vault of the uterus. Either by accident or design, the fetus is in the characteristic "See No Evil" posture and is in the left occipitoanterior position with head downward and the face directed to the right. To the sides of the lower pole of the uterus are seen the uterine horns of pre-Vesalian anatomy. A small metal peg in the lower part of the uterus indicates that at some time there had also been the cup-shaped anterior wall of the uterus.

Traces of pigment can still be seen arranged in definite lines on the

back of the ivory flaps which probably were meant to represent the course of the blood vessels. The lungs, diaphragm, liver, and intestinal coils are missing in both figures. These were probably all loose pieces which had to be fitted in carefully and so have been lost. The carving of the visceral organs is very delicate; the proportions are fairly accurate, but the anatomic errors are the same as shown in the early anatomic fugitive sheets which undoubtedly were the models for this pair of manikins as well as for those described by Thompson.

The attitude and facial expression of these figures seemed strangely familiar, and some time later, glancing at the title page of my 1604 edition of Vesalius, the reason for the association struck me. This famous title page, engraved by Valegio, is divided into six compartments; in the lower corners are represented the male and female torso, open to the viscera. My ivory figures are so similar in hairline, poise of head, facial expression, and shape of trunk that Valegio's engravings must have served as a model for the figures, with the reversion not uncommon, even in the illustrations of that period, to the pre-Vesalian anatomy of the fugitive sheets in representing the shape and position of the viscera. This association rather definitely indicates that these figures must be of Italian seventeenth century workmanship.

The function of these carved ivory manikins is but little known or understood, since there are few references to them in either the history of anatomy or of art. Mr. Thompson, at the conclusion of his article, definitely ascribes them to teaching purposes, upon the authority of a document found in a case containing a pair of these figures, which stated that they had been used for teaching barber surgeons so they might know as much pelvic anatomy as the midwives. This document, however, was dated 1786, and whether this was the function of the manikins a century and a half before is difficult to determine. To me, it seems more probable that these ivory manikins were rather an expression of the constantly recurring idea of the advantage of models over prints, and an example of the effort recurrently made to devise various anatomic representations in plastic rather than graphic art.

But any such matter of fact conclusion may be upset by a trivial bit of information derived from the persistence of superstition in primitive medical folklore. I have shown these figures to numerous friends, both professional and lay, with no other reaction than an expression of curiosity, but recently, a visitor gave me a clue which offers another explanation. She told me that when a bride in 1865, she attended a course of popular lectures on the physiology of pregnancy for young married women, and that the demonstrations were based upon ivory figures such as these; so even as late as the early Victorian period, these figures were used in pseudoscientific teaching, and this survival indicates a similar use in the earlier period.

# THE RELATION BETWEEN CELIBACY IN WOMEN AND DEFECTIVE PELVIC ORGANS\*

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WITH A NOTE BY RAYMOND PEARL, PH.D., JOHNS HOPKINS UNIVERSITY

THERE must naturally be many causes for celibacy in women, such as economic pressure (the need for helping dependent relatives, or the inability of a prospective husband to support two or three people); the quite excusable fastidiousness which comes with a higher education and an economic independence; the death of a first love, and so forth, but any physician of experience must have noted how frequently the unmarried woman of mature years is found to have some pelvic disease or some signs of hypogonadism, conditions which have probably made her less willing, or less able, to enter the married state.

As will be seen later, most of these women seem eventually to find mates, so that there are any number of sexually unattractive "old maids" among the married. Furthermore, there are many beautiful women who are frigid and anesthetic apparently for psychologic reasons, just as there are many unattractive ones with diseased pelvic organs who are sexual enough to secure one indulgent husband after another.

Under such circumstances no conclusions should be drawn from the impressions which are left in one's mind by striking cases, but the problem should be attacked statistically. An opportunity to do this came recently while we were studying the relation between hypogonadism and hypertension. We then had occasion to divide the case histories of 1,227 women (office patients of one of us) into three groups designated: sexually normal, sexually abnormal (+), and sexually abnormal (++). The second group included all those who had or had had abnormal menstruation, fibroids, an infantile type of uterus, badly cystic ovaries, a masculine distribution of hair, sexual anesthesia, or thyroid disease. It included also those who had suffered the removal of a diseased uterus or defective ovaries. As some of the cases were on the borderline and hard to classify, the third group (++) was made to include those who were certainly abnormal and of the type that would interest an endocrinologist.

It can be seen from Table I that of the 1,227 women, 46.8 per cent were normal, 41.7 per cent were +, and 11.5 per cent were ++. Twenty-

\*Work done at the George Williams Hooper Foundation for Medical Research, University of California Medical School.

TABLE I  
PERCENTAGES OF SINGLE, MARRIED AND DIVORCED WOMEN

GROUP	NORMAL			ABNORMAL						TOTAL	
	CASES	PER CENT OF		CASES	+		CASES	++		CASES	PER CENT
		NORMAL WOMEN	TOTAL WOMEN		ABNORMAL (+) WOMEN	TOTAL WOMEN		ABNORMAL (++) WOMEN	TOTAL WOMEN		
Single	134	23.4	40.3	146	28.0	44.2	52	36.0	15.5	332	27.0
Married and widowed	412	72.0	48.7	347	68.0	41.0	86	60.0	10.3	845	69.0
Divorced and separated	27	4.6	54.0	17	4.0	34.0	6	4.0	12.0	50	4.0
Totals	573		46.8	510		41.7	144		11.5	1227	



seven per cent were single; 69 per cent were married, and 4 per cent were divorced or separated.

Fig. 1 shows that the percentage of married women, as we expected, decreases rapidly as one passes from the normal to the + and ++ groups. The percentage of single women rises accordingly, and the percentage of separated and divorced women remains practically the same. The two lines in the center of the graph show that among the

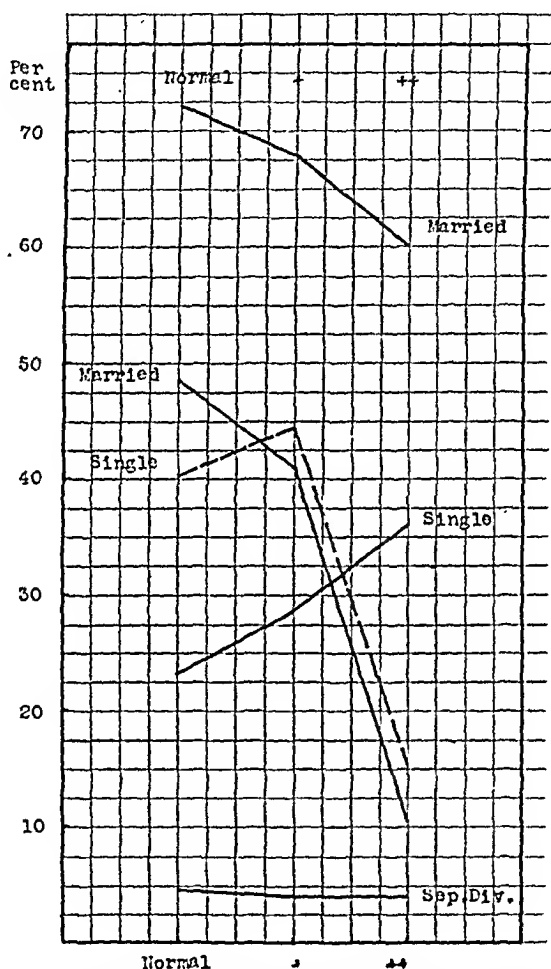


Fig. 1.—The percentages of married, single and divorced women in the three classifications: sexually normal, sexually abnormal (+), and sexually abnormal (++). The two lines in the center of the graph show the percentage distribution of all married and all single women within the three classifications.

married, some 50 per cent are normal, some 40 per cent are +, and 10 per cent are ++. Of the single women about 40 per cent are normal, 45 per cent are +, and 15 per cent are ++.

In Table II and Fig. 2 the women have been divided into four age-groups to bring out the fact that the big difference in nubility comes in the early years. Most, even of the sexually deficient, eventually get married, but those with poor pelvic organs either choose to wait or are compelled to wait until their more sexual sisters have taken

their pick of the available men. They appear to be handicapped during those years when sexual attractiveness is the important factor. Later, when marriage is contracted more soberly for companionship or home building, they seem to be able to hold their own with the widows.

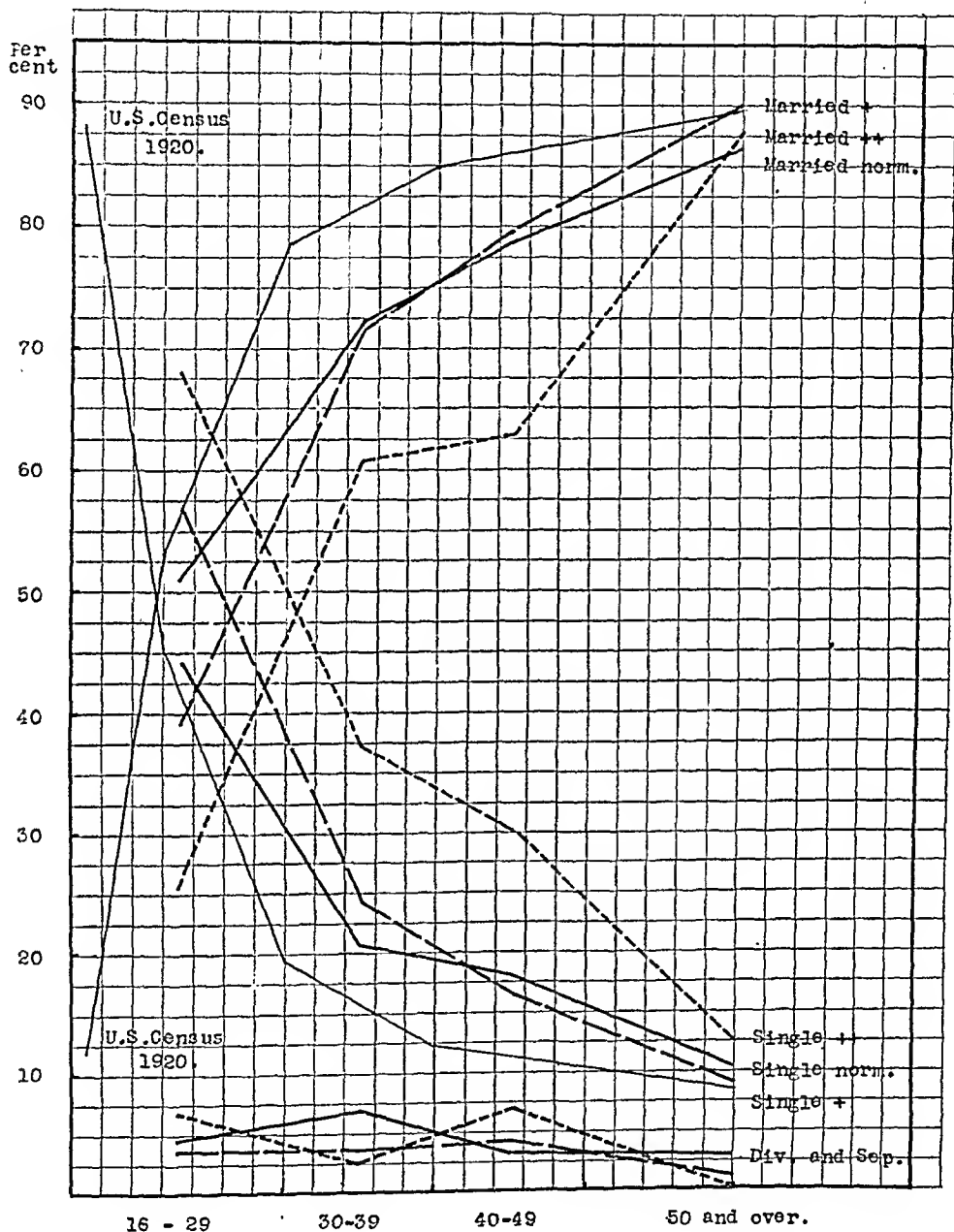


Fig. 2.—The division of women by per cent into single, married, and divorced groups at the different ages. The slowness of the sexually deficient to get married in the earlier years is shown. The fine line represents figures from the United States Census for 1920, and shows the relative proportion of single and married women in California.

Fig. 2 shows that in California some 9 per cent of the women over fifty are single. Unfortunately, it does not show how many of the young women starting out in life stay single; how many move over into the married group, and how many die. It would be interesting

TABLE II  
PERCENTAGES OF SINGLE, MARRIED AND DIVORCED WOMEN ACCORDING TO AGE-GROUPS

GROUP	AGE, YEARS	SINGLE				MARRIED AND WIDOWED				DIVORCED AND SEPARATED				TOTALS	
		CASES	PER CENT OF			CASES	PER CENT OF			CASES	PER CENT OF			CASES	PER CENT OF TOTAL WOMEN IN THIS GROUP
			TOTAL SINGLE WOMEN	TOTAL WOMEN OF THIS AGE	TOTAL MARRIED WOMEN		TOTAL WOMEN OF THIS AGE	TOTAL DIVORCED WOMEN	TOTAL WOMEN OF THIS AGE						
Sexually normal	16-29	66	49.3	44.3	76	18.4	51.0	7	26.0	149	26.0	26.0	149	26.0	
	30-39	32	23.9	20.6	112	27.2	72.3	11	40.7	155	27.0	7.1	155	27.0	
	40-49	20	14.9	17.9	88	21.4	78.5	4	14.8	112	19.5	3.5	112	19.5	
	50 +	16	11.9	10.2	136	33.0	86.5	5	18.6	157	27.5	3.2	157	27.5	
	Total	134		23.4	412		72.0	27		573		4.6			
Sexually abnormal (+)	16-29	78	53.5	57.4	53	15.3	39.0	5	29.4	136	26.7	3.6	136	26.7	
	30-39	40	27.4	24.4	117	33.7	72.0	6	35.2	163	32.0	3.6	163	32.0	
	40-49	20	13.7	16.5	95	27.4	79.5	5	29.4	120	23.5	4.2	120	23.5	
	50 +	8	5.4	8.9	82	23.6	90.0	1	5.9	91	17.9	1.1	91	17.9	
	Total	146		28.0	347		68.0	17		510		4.0			
Sexually abnormal (+ +)	16-29	21	40.3	67.6	8	9.3	25.8	2	33.3	31	21.6	6.6	31	21.6	
	30-39	14	27.0	37.0	23	26.8	60.5	1	16.7	38	26.4	2.5	38	26.4	
	40-49	13	25.0	30.3	27	31.4	62.8	3	50.0	43	29.9	6.9	43	29.9	
	50 +	4	7.7	12.5	28	32.5	87.5			32	22.1		32	22.1	
	Total	52		36.0	86		60.0	6		144		4.0			

to know the number of women who remain celibate all their lives and the number who do so on account of poor pelvic organs. The problem is complicated somewhat by the fact that there are no good statistics regarding the comparative mortality of the single and married.

In the report on the Vital Statistics of New York State for 1909-1911,<sup>3</sup> it is stated that the mortality of the spinsters was half again as large as that of the married. That is what might be expected from the fact brought out by this study that the spinsters have more hypertension and more pelvic disease, conditions which, with their sequelae, can shorten life. This great mortality among spinsters is not so marked, however, in Scotland, where Dunlop could demonstrate it only by subtracting from the mortality rate of the married that fraction due to the accidents and sequelae of childbirth.

We appealed to Dr. Pearl for a method with which to estimate the probability at any age of a woman's remaining single, and he very kindly sent us the following information. The problem is complicated on account of the lack of basic data. He writes: "If the  $l_x$  or number of survivors of age  $x$  in a life table population is multiplied by the proportion of single persons at that age in the actual population, the product  $B_x$  represents the number of single persons aged  $x$  in the life table population. If the sum of the  $d_x$ 's for a given age-group is multiplied by the proportion of single persons in that age-group in the actual mortality statistics, the product  $\theta_x$  represents the number of single persons dying in that age-group in the life table population, and the sum  $\sum_x \frac{\omega}{x} \theta_x$  is the number of persons dying unmarried at the age  $x$  or above. The probability of a person aged  $x$  dying unmarried is therefore  $\sum_x \frac{\omega}{x} \theta_x / B_x$ .

"A life table for California females is given in the United States Abridged Life Tables for 1919-1920 (Washington, Government Printing Office, 1923) and the proportion of single women in the different age-groups of the living population is given in the 1920 Census. As I could find no data for the percentages of single among deaths in California, I assumed that they were in the same ratio at each age to the percentages for Massachusetts, which are tabulated, as the corresponding percentages for the living in the two states. As the different quantities used were tabulated for different age-intervals I have reduced them to the same interval by graphic interpolation (Table III)."

It will be noted from Table III that the probability of a young woman, between fifteen and nineteen, remaining single is 1:10. Of the 267,635 single women in California in 1920, 64.6 per cent were between sixteen and twenty-nine years of age; 16.4 per cent were between thirty and thirty-nine; 9.6 per cent were between forty and forty-nine, and 9.4 per cent were over fifty. Conditions in this state,

TABLE III  
PROBABILITY OF A CALIFORNIA FEMALE DYING UNMARRIED

AGE, YEARS	PER CENT OF FEMALE POPULA- TION SINGLE*		RATIO, CALIFORNIA TO MASSACHUSETTS	PROPORTION SINGLE IN MASSACHUSETTS DEATHS	PROPORTION SINGLE IN CALIFORNIA DEATHS	CALIFORNIA† d x CUMULATED	ESTIMATED SINGLE DEATHS	CUMULATED	PROPORTION SINGLE IN CALIFORNIA POPULATION AT BEGINNING OF AGE GROUP	I <sup>x</sup>	ESTIMATED LIVING SINGLE	PROBABILITY OF DYING SINGLE
	CALIFORNIA	MASSACHUSETTS										
15-19	88.0	95.0	.926	.902	.835	1,710	1,428	8,612	1.000	88,920	88,920	.10
20-24	45.2	62.7	.721	.325	.379	2,460	932	7,184	.62	87,210	54,070	.13
25-34	19.4	30.6	.634	.242	.153	5,900	857	6,252	.30	84,750	25,430	.25
35-44	12.2	19.9	.613	.197	.121	5,590	676	5,395	.15	79,150	11,870	.45
45-54	10.5	17.3	.607	.186	.113	7,460	843	4,719	.11	73,560	8,092	.58
55-64	8.4	15.9	.528	.160	.084	12,020	1,010	3,876	.080	66,100	5,288	.73
65+	5.5	13.1	.420	.126	.053	54,080	2,866	2,866	.053	54,080	2,866	1.00

\*11th Census, Vol. II, chapt. 4, Table II.

†U. S. Abridged Life Tables, 1919-20 (graphic interpolation).

however, are somewhat abnormal, on account of the large influx of elderly people.

The two fine lines in Fig. 2 represent data from the 1920 census for California. The location of these lines suggests that even our sexually normal patients were a little slow in getting married, but that is probably due to the fact that for the most part, their social, educational, and financial statuses were above the average for the state.

There can be little question that sexual anesthesia and hypogonadism account for a good many divorcees, and we observed a number of instances of that during this study. It does not show up statistically, however, because in Table II one finds no preponderance of + and ++ cases in the fifty divorced and separated women. Often, of course, the trouble is due to the husband, as in one of our cases where an attractive young woman confessed to having had two divorces. Under these circumstances we rather expected to find a history of frigidity or bad temper, but we found instead that she had turned against the first husband for giving her syphilis and against the second for giving her gonorrhea.

In passing, it might be of interest to note that in a number of cases sexual anesthesia was plainly a family trait. Thus, a woman who had been deserted on account of her anesthesia brought in her fine-looking daughter to see if something could be done to correct her repugnance for any signs of affection on the part of her admirers. The grandmother admitted that she had almost lost her husband on account of the same difficulty. In another family three sisters found their sexual lives very repugnant to them, and we suspect that their father's desertion of their mother was due to the same cause.

There are two cases in our series which indicate that the anesthesia can persist as a physical defect even when the psychic reactions are favorable. In both instances the women were finely built and attractive in every way. One, to please her family, was married at sixteen to a man of fifty; the other married a man she did not love in order to spite the man she did want. One does not wonder that anesthesia was present under these circumstances, but the interesting point is that it was just as bad later when these women had illicit relations with men to whom they were devoted.

This whole problem of intermediate or borderline sexuality in women is a most important one as the victims so often are unhappy, poorly adjusted, wondering what the trouble with them can be, and turning for help to a profession which so far has devoted little thought or attention to the problem. When one succeeds in getting the confidence of these women and when one gets them to pour forth the questions which have been uppermost in their minds, one often finds that they have gone from one physician to another with some vague complaint, really hoping to find some man to whom they could talk.

Why their repugnance for something that their normal sisters can enjoy; and why the barriers between them and maternity and the other phases of married life which they crave? These are the questions that crowd forth, and these are questions to which the profession must try to find answers. Those who have the requisite cleanliness of life and mind and face to invite these confidenees must take time to draw these women out. They must learn to make their confessions easy for them, and they must help them so far as they can to understand the situation and to adjust themselves to it.

Much must be done to educate the mothers of the land and especially the anesthetic ones so that they will not pass on to their daughters a repellent, terrifying or disgusting idea of the sexual life. Something perhaps may also be done through the education of the men. That the problem is an important one can be seen from the fact that 16 per cent of the 1,000 women, who answered a questionnaire sent out by Davis, stated that their sexual life was indifferent to them and another 10.4 per cent that it was actually distasteful.

#### SUMMARY

A study of 1,227 women shows that in the early years of life, before the age of thirty-five, there is a relation between defective pelvic organs and celibacy. These defects interfere with marriage during the years when sexual attractiveness is important. Later, they seem to have little effect.

Pearl has worked out the probability of a women of age  $x$  dying single; for ages between fifteen and nineteen it is about 1:10.

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## THE RESPIRATORY EXCHANGE OF THE FETUS

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THE nutrition of the fetus depends mainly upon the types of food it receives and upon its own peculiar metabolism. The evidence at the present time indicates that protein in the form of amino-acids, and carbohydrates, pass the placental membrane by simple diffusion from mother to child, while fats and their derivatives, the lipoids, do not traverse this partition, but that the fetus manufactures its own fat, and most probably wholly from carbohydrates. Slemons<sup>1</sup> has given an excellent account of the experimental work up to 1919. Since that date, Tyler and Underhill<sup>2</sup> have corroborated the results of Slemons and Stander<sup>3</sup> on fetal fat metabolism. More recently, Wesson,<sup>4</sup> by placing different groups of rats on diets containing different percentages of highly unsaturated fatty acids and analyzing for these in the fetuses, also came to the conclusion that the fetus probably synthesizes the fatty acids.

From the evidence referred to above, as well as from the work of Ahlfeld,<sup>5</sup> Oshima,<sup>6</sup> Murlin and Bailey,<sup>7</sup> Gage and Gage<sup>8</sup> and Mendel and Daniels,<sup>9</sup> it seems well established that the fetus must synthesize its own fat. Thiemiehl<sup>10</sup> also concludes that in the dog the fetus does not derive its fat from the mother, although he later modified this view on the basis of another experiment, believing that the fetus derived a portion of its fat, at least, from the mother. Hofbauer,<sup>11</sup> on the other hand, concludes that fats are transmitted from mother to fetus, but one must agree with Wesson,<sup>4</sup> in his critical review, that Hofbauer's results appear to be of an inconclusive nature.

Believing then, that the fetus derives its amino-acids and carbohydrates from the mother and that it synthesizes its own fat, probably from carbohydrate, it becomes important to study the respiratory exchange of the fetus. We know from the work of Cohnstein and Zuntz<sup>12</sup> that oxygen and carbon dioxide pass the placental membrane according to the laws of diffusion. Bohr<sup>13</sup> showed that in the guinea pig, in the later stages of pregnancy, the fetus has a respiratory exchange as high as that of the mother, and further demonstrated that the fetal respiratory quotient is unity, indicating that carbohydrates are the source of its energy. Murlin,<sup>14</sup> working on newborn puppies, came to the same conclusion. Russell and Woglorn<sup>15</sup> determined the respiratory quotient of minced embryonic tissue and found it to be unity.



It occurred to us that the respiratory quotient of the human fetus could be determined were one able to procure samples of arterial and venous bloods from the umbilical cord before the child started breathing.

The technic developed for obtaining these blood specimens is as follows: In a spontaneous delivery of a normal multipara where no anesthesia is necessary, the cord is clamped with two Kelly clamps close to the body of the child as soon as it appears at the vaginal outlet, and *before* the child breathes. Two clamps are also immediately applied as close as possible to the placental end of the cord. By now cutting the cord between the clamps applied at the one end as well as between those at the other end, one obtains a piece of cord usually about twelve inches in length, tightly clamped at either end, and containing enough venous and arterial fetal blood for a complete gas analysis. The blood specimens are obtained by means of a needle and syringe containing about 2 c.c. of paraffin oil. The blood samples are immediately transferred to a small bottle containing paraffin oil and a sufficient amount of sodium oxalate to prevent clotting. Both venous and arterial blood specimens are at once analyzed for oxygen and carbon dioxide content. In all the analyses, I have used the constant volume, closed manometer, Van Slyke apparatus, and have followed the technic of Van Slyke and Neill.<sup>16</sup>

The oxygen and carbon dioxide contents are expressed as volumes per cent. It is evident that the difference in oxygen content between the arterial and venous blood represents the amount of oxygen utilized by the fetus, and similarly that the amount of carbon dioxide produced by the child is the difference in carbon dioxide content between the venous and arterial blood. We may then write:

$$R. Q. = \frac{A}{B},$$

where R. Q. = Respiratory Quotient,

A. = Difference in carbon dioxide content of venous and arterial bloods,  
and

B. = Difference in oxygen content of arterial and venous bloods.

The results reported in Table I are in cases where labor was easy and with no apparent asphyxia in the child, and where the mother received no, or exceedingly little, anesthesia. In order to further safeguard against the effect of asphyxia, I studied the respiratory quotient of the fetus in two cases of cesarean section. In these experiments, the cords were clamped and cut in the same manner as described above, immediately after the incision of the uterus and before the child breathed. The findings are given in the latter part of Table I. To determine the effect of ether on the respiratory quotient, some experiments were performed on dogs. Using the apparatus already described<sup>17</sup> for estimating the heart output, I determined the respiratory quotient in two normal female animals without and with anesthesia, respectively. The results are given in Table II.

A further experiment was done on a pregnant dog at term and probably in labor. The animal's respiratory quotient was determined; it was then anesthetized, an abdominal incision made, the uterus exposed, and blood specimens obtained from the uterine artery and vein.

TABLE I  
R. Q. OF HUMAN FETUS

WEIGHT IN GM.	SEX	CONDITION	R. Q.	REMARKS
2980	Male	Good	1.21	Normal spontaneous delivery
3200	Male	Good	1.11	Normal spontaneous delivery
3420	Female	Good	0.92	Normal spontaneous delivery
2860	Female	Slightly asphyxiated	1.00	Normal spontaneous delivery
3620	Male	Good	0.97	Normal spontaneous delivery
3480	Male	Good	0.90	Normal spontaneous delivery
3690	Male	Slightly asphyxiated	0.99	Normal spontaneous delivery
3145	Female	Good	1.25	Normal spontaneous delivery
4100	Male	Good	1.11	Normal spontaneous delivery
2980	Female	Slightly asphyxiated	1.05	Cesarean section
3240	Female	Good	1.04	Cesarean section

TABLE II  
THE EFFECT OF ETHER ON THE R. Q.

DOG	WEIGHT	BREATHING PERIOD	CONDITION	R. Q.
No. I	11 kg.	3 minutes	Unanesthetized	0.86
No. I	"	4 minutes	Under Ether	0.97
No. II	13.4 kg.	4 minutes	Unanesthetized	0.82
No. II	"	4 minutes	Under Ether	0.90

These blood samples were immediately analyzed for oxygen and carbon dioxide. While the dog was still under ether, its R. Q. was again determined. I also attempted to obtain samples of arterial and venous blood from the individual cords of several of the puppies. Great difficulty was here encountered because of the size of these vessels, but in one instance enough blood was obtained for a single set of determinations. The animal was then delivered of nine living puppies, all in good condition. The results were as follows:

Mother's R. Q. before ether anesthesia = 0.74

Mother's R. Q. under ether anesthesia = 0.79

Pup's R. Q. calculated from uterine vessels = 0.90

Pup's R. Q. calculated from cord vessels = 0.93

From these findings, as well as those reported in the tables, it appears that the respiratory quotient of the fetus approaches unity. We have studied and endeavored to eliminate the effect of anesthesia and asphyxia on the respiratory exchange of the child.

The work of Porges and Novak<sup>18</sup> and Harding<sup>19</sup> teaches us that a diet poor in carbohydrates leads to an excretion of acetone bodies in the urine in a normal pregnant woman, whereas this is not the case in a nonpregnant person. The excretion of these substances can be suppressed by adding carbohydrates to the diet. The experiments of Bohr,<sup>13</sup> of Lochhead and Cramer<sup>20</sup> and of those already referred to in this paper, show the great importance of carbohydrates for the development of the fetus. Our results are further evidence that the fetus uses, at least at the end of pregnancy, carbohydrates as its source of energy.

What effect labor may have on the respiratory quotient of the fetus is not known, though it is probably negligible. Some light may possibly be thrown on this problem from studies which we are at present conducting on the respiratory exchange of the mother before, during, and after labor.

#### SUMMARY

The experimental evidence at present indicates that amino-acids and carbohydrates pass the placental membrane from mother to child, whereas fats do not; that the child most probably synthesizes its fat from carbohydrate; and that the fetus utilizes carbohydrates as its source of energy.

#### CONCLUSIONS

1. The human fetus has a respiratory quotient of approximate unity.
2. Ether anesthesia and asphyxia do have an effect on respiratory quotient determinations in the fetus, but this effect may be eliminated or fairly well evaluated.
3. From a study of the respiratory quotient of the child at the time of delivery, it appears that it utilizes carbohydrates as the source of its energy.

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# FUNCTIONAL DISEASES OF THE FEMALE GENITAL ORGANS

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IT IS to be expected that as civilization changes, new disharmonies should arise in man that are of great importance to the physician. In a natural system, such as that under which the lower animals exist, disharmonies are constantly weeded out by natural selection, until the animal becomes better and better adapted to his environment. In man, however, biologic evolution has ceased completely, for man has at his command a tool, the intellect, which enables him to mold his environment artificially and to fashion it according to his needs and desires. Hence we have the phenomenon of an increasing complexity of social institutions in which man, just because he is biologically static, could not live without long youth and special training.

We repeat that men, unfortunately for their physical well-being, do not adapt their social environment to their biologic needs. Moreover, as they are endowed with mental powers forever seeking something novel, new needs and desires, artificial from a biologic point of view, come into existence and necessitate the suppression of natural ways of living. But for every compromise of this sort, a subsequent disharmony is inevitable. For in a natural environment man would employ all his organs according to their structure and biologic purpose; socially, however, such an instinctive life is impossible, and this gives rise to very grave problems of a medical and sociologic nature.

This paper shall present a study of a particular example of sexual disharmony, which is caused by the fact that women, under the existing order of social life, are prevented from permitting their sexual organs to function in accordance with their structural purpose. This is due in part to the change in standards of social morality, and in part to the necessity and opportunity for women to seek employment of an industrial nature.

Our problem is to be a study of endometritis in its varying forms, and the thesis which we shall advance is that in many cases of so-called endometritis we must take into consideration such social factors as woman's place in industrial life and the consequent sexual disharmony as being of chief importance in the diagnosis.

A disease may present an extremely clear etiology of structural impairment, with a resulting disturbance of function. On the other hand, the organ may be unaffected originally, and the cause of the disease originate with the disturbance of the function of that organ. Now, when we have a disturbance of function as the starting point of a disease, we must expect to find per se a social situation.

This fact is generally lost sight of in gynecologic problems. Heretofore disorders due to reflex action have not been thoroughly analyzed. They have been attributed to misplacement of the uterus and adnexa, and some method or other of uterine fixation was unhesitatingly adopted. But since these disturbances are subject to relapse, and the operations are not of permanent benefit, all these more or less violent methods of treatment would seem to be far from ideal.

The truth is that, in view of the historic development of gynecology, and in view of our deep-rooted respect for internal medicine, a symptomatic therapy receives sole consideration. The brilliant development of operative gynecology and x-ray naturally directs the gynecologist's attention towards the diseased female organs rather than to the woman herself as a social creature. But after a consideration of the status of women today, and her consequent maladaptation to the social environment, we must realize that many gynecologic clinical pictures call for re-interpretation. For this reason, we should aim not at a therapy of an operative nature, which results in a climacterization, or matronization, of the patient, but we should rather direct our attention, in those cases which obviously imply a social disharmony, to a rejuvenation of the patient by a readjustment of her life wherever this is possible.

We shall consider the various forms of metropathy from this standpoint of functional disturbance occasioned by social factors. In spite of many discussions concerning endometritis, metritis, metroendometritis, etc., the diagnosis as such is still obscure. As long as we could construe clinical phenomena as the typical anatomic diagnosis of metritis and endometritis, we felt that we had a tolerably satisfactory conception. But when these terms are applied to disturbances of the genital organs which originate in the distortion of sexual functions due to artificial social life, we are at sea. We find that the distinction between metritis and endometritis proves to be, in the main, nothing but the successive stages of the normal cycle of menstruation distinguished by its progressive and retrogressive changes. In addition, since neither the relative measurements of the uterus, nor its consistency, nor the growth or increase of the connective tissues, nor vascular changes, can any longer be looked upon as characteristic of metritis, the confusion becomes greater than ever.

We feel that this confusion is dispelled by a division of so-called endometritis into two groups. The first group contains those cases whose etiology is clear, where we can readily ascertain the causes of the pathologic conditions of the endometrium and of the myometrium. This is the form induced by gonorrhea, sepsis, tuberculosis, and other inflammations due to microorganisms. Along with these etiologic factors may also be classed local irritants consisting of retained products of conception. This form of endometritis is clearly brought about by a local irritant and is attended by the three cardinal symptoms of all female

diseases; namely, discharge, hemorrhage, discomfort and in some cases also by pain. The method of treatment is clearly indicated: Removal of the local cause, which if successful will effect a speedy cure. This is best seen in the least questionable form; namely, in endometritis after a simple abortion, when a removal of the products of conception leads to a quick and complete return to health. To this group, whose cause, as can be proved, is local irritation, the term "endometritis" is applicable, and should be applied to this group exclusively. We may also (here) employ the term "metroendometritis" to denote an irritation occurring in the mucosa of the uterus and the muscularis, and often accompanied by real inflammation (lymphocytes, plasma cells, etc.), which may further lead to hyperplasia. In such cases everything is clear; cause, effect and treatment, and therefore we can apply to this group a specific and definite terminology. Such cases have been scientifically established and are well-nigh closed to further investigation.

It is to the second group that we shall direct our attention. This is the group which we feel involves in its etiology the sexual disharmonies resulting from the social maladaptation of women. To this group we shall apply the very indefinite and general term "metropathy," for here our ground is not so clear. The discussion of metropathy must involve, if we would dispel many of the confusions that exist, a study of woman's sexual life as it is affected by modern civilization. In our discussion we shall not consider the asthenic individual who, because of her chromosomal deficiencies, shows throughout the reproductive period—from menarche to menopause—psychic contradictions and catastrophes. Nor shall we take into consideration other constitutionally defective individuals, to whom the carrying out of even normal sexual functions is pernicious. We shall limit our analysis to the disturbed functions of women who are practically normal in all other respects.

We are led to our distinction between endometritis and metropathy by observing that there is a second group classified as endometritis, which, however, presents a symptom-complex different from that in the first group which we have briefly discussed. In this second group, metropathy, there are, of course, the typical discharge and bleeding, but along with these we find a severe discomfort and a more or less disturbed condition of the lower abdomen, in fact, of the whole organism, physical and psychical. While a search for a local cause in the mucosa and the myometrium will occasionally reveal hyperplasia and degeneration, the findings are not really convincing. Indeed, the histologic findings in the mucosa, the myometrium, even in the ovaries, etc., present such varying aspects that one no longer cares to call them characteristic. But a comparison of such conditions with those manifest in senile endometritis throws a light on this matter. To be more explicit, this climacteric form (senile endometritis) attended with discharge and often with

hemorrhage, is attributable to the cessation of the inner ovarian secretion, and the consequent circulatory and trophic disturbances.

This phenomenon appears more frequently and is far more severe when an artificial menopause is brought on abruptly and prematurely, whether by the pernicious x-ray treatment or by the surgical removal of the ovaries. This process has its basis in the complete dependence of the endometrium upon the whole organism and its chromosome functions, and in the relations existing between the ovarian function and all other internal secretions. Now the cause of the second form of endometritis or metropathy is found in these same basic conditions and relations, as will be explained further on.

To continue: In both stages of life, in puberty as well as in the climacteric period, we find functional disturbances, irregular, that is to say, excessive or scanty bleeding and leucorrhea. Such disorders may be due in part to local causes found in the uterus and in the undue proportion between the musculature and the connective tissue and in part they may result from the dysfunction of the whole organism in not being properly adjusted to the required production of blood and secretion.

In developing my opinion at length, I shall be guided by the main symptoms of functional disturbances; namely, irregular bleeding and discharge. These symptoms stand in definite relation to the sexual functions and have their root there. For this reason I would characterize the x-ray treatment as pernicious, since it so seriously interferes with these functions. The gynecologist, moreover, can no longer shut his eyes to the fact that the basis on which woman develops her womanhood and her feeling of individuality is, in the main, her sexual life, and that she therefore, cannot afford to have the menopause brought on prematurely. To resume: The menstrual bleeding is a sign that an ovum is destroyed. The graafian follicle and ovum must be completely removed in order to make room for the next follicle and ovum. Therefore, we define menstrual disorders as the outer expression of irregularities in the destruction of one nest and the subsequent formation of another. Now, between two periods there should be no bleeding, yet there is, at times, a normal hypersecretion from the uterine and the cervical glands. A certain amount of fluid is essential in the cervix, in the uterus, in the abdomen, and in the fallopian tubes so as to enable the spermatozoa to move upward toward the tube and the ovum to move downward and thus effect a meeting of the two.

It is evidently a fact that in every sexual stimulation, direct or indirect, there is an inundation, or at least a thorough moistening of the genital tract. Thus the secretion from the uterine glands is a function of the female to further, to a certain extent, the motility of the spermatozoa. During menstruation, bleeding and glandular secretion are not separable, and it is a mixture of these elements in varying proportions

that form the menstrual flow. Thus regular bleeding during menstruation and a moderate amount of glandular secretion during both menstruation and cohabitation, may be looked upon as the functional expression of normal female sexual life.

When any disturbances occur in woman's sexual life, the whole organism is liable to become upset and to suffer. That, moreover, many women have to undergo such sufferings is evidently true, although we can give no reliable statistics. This number, however, must be great, judging by the many cases physicians come in contact with every day, and taking into account the many women who, assuming as a matter of course, all kinds of sex discomfort and sex disorders, bear these without uttering any complaint. It needs only a knowledge of the great amount of patent medicine sold to women for such ailments to make us realize how large is this class of sufferers. But to continue: A woman's reproductive activity presents a chain of fertile and sterile functions, and where nature has full sway the chain starts with a fertile function and practically consists of fertile ones only. But in our present-day civilization the sterile functions far outnumber the fertile ones, if indeed, they do not become the rule. Probably modern civilization is to blame for this unnatural condition since it prevents the uterus, intended for strong organic activity, from functioning at the proper time, if not altogether, thus furnishing one cause of myoma and functional endometritis, or metropathy.

The trouble is that we are trying to force into a few decades a constitutional change which ought to be gradual, occupying perhaps thousands upon thousands of years. Of course, social economic conditions are such as to make this abrupt change from housework to long hours of tense occupational work imperative. Yet it is this unmitigated change that brings on many new functional disturbances with their indistinct and confusing symptoms; in other words, female disorders difficult to classify, to diagnose, and to cure.

Now when the anatomic findings prove insufficient to interpret the resulting conditions accurately, the various terms endometritis, metritis, metroendometritis, ought to be replaced, as has been suggested, by the simple colorless term "metropathy," which I shall now use exclusively to denote such functional disturbances. This term, moreover, is quite in harmony with our present state of knowledge, as the results from our therapy merely confirm that we are groping in the dark. For in one case local treatment helps; in another it is useless. Once we accomplish good results by means of general treatment, next time we experience complete failure. The same holds good for a combination of local with general treatment. Moreover, the endeavor to locate the disorder in the region of the inner secretions by methods, no matter how subtle, is at present nothing but an attempt, very promising indeed, yet lacking in positive results.



Briefly this form of so-called endometritis, or metropathy, presents great uncertainty as to etiology, clinical findings, treatment, terminology, and results. Yet we are dealing with a widespread, a serious disease, which not merely interferes with the pleasure of life, but which, in many cases, reduces bodily efficiency and will in time ruin the nervous system. It will suffice to recall merely the excessive and all too frequent loss of blood, a loss of valuable organic products which takes a long time to recover. Where all other means fail, it is now and then necessary, solely to preserve the functioning of the organism, to remove the excessively bleeding uterus completely. This may be advisable, simply because of its abnormal functioning, even in cases where no definite pathologic changes are in evidence.

In the course of time I have formed an opinion somewhat at variance with the usual unstable conception regarding the baffling form of chronic endometritis, or metroendometritis, or preferably metropathy. In developing this, let me refer again to woman's occupational work and its consequences. For is it not an observation common among the medical profession, that most women who take up vocations peculiarly suited to the male sex, are affected, sooner or later, with metropathy? You ask: Why? Well, no other reason can be assigned except the essential difference between man's and woman's sphere of activity as conditioned by their respective constitutions. The woman, so easily fatigued, should be spared all additional exertion during menstruation with its inevitable internal strain, for she is ill-suited, as experience has proved, to stand the uninterrupted even tension of vocational work. When a woman is subjected to such strain, dysfunctions are liable to arise, causing metropathy. This vocational factor seems, in my opinion, to be, despite its vagueness, far more harmful than local neglect during menstruation. To be sure, such common neglect may also contribute its share toward metropathy by causing abnormal decomposition of menstrual blood. The fact that working women cannot, for obvious reasons, carry out their natural reproductive functions, and thus have to impose great restraint upon the sexual organs, is one of the worst features of this walk in life. Thus the disorder, often presenting a combination of local irritation with general functional disturbances, may develop more quickly and distinctly. The experience that in the absence of other factors, a vocation not at all suited to woman's nature induces metropathy, enables us to arrive at the real cause of this common disease. We have now called attention to the two factors which in themselves may be held accountable for the abnormal and excessive bleeding and leucorrhea of the uterus, or if you wish, the two factors which cause a predisposition towards such abnormal functioning, called metropathy. These factors are: (1) In general, maladaptation occasioned by civilization, and in particular the rigors of occupational vocations little suited to women. (2) The subsequent suppression of the natural reproductive

activities. Subsequently there is a functional deviation, as seen in both bleeding and leucorrhœa of the uterus, and in addition, great discomfort and pain. That these two factors mentioned are, in truth, the cause of metropathy may be deduced from the especial prevalence of this condition among the laboring classes.

To reach an intelligible etiology of metropathy, a thing to which we have hitherto paid little attention, we need go but one step farther and that is to consider the violence done to woman's sexual function in her normal social life. When you recall the fact that the uterus is seldom allowed to bear its full quota, and that in many cases it is not allowed to bear fruit at all, it is certainly not necessary to ask: What girl, or what woman lives a normal sexual life today? Just consider the female genital function in unrestrained natural life. Compare this function in its purely natural state with its status in the case of an old maid or of the married woman with one or two children, or none at all, as is considered quite normal today. You will admit that our view in this matter must certainly undergo a great change, and that our therapy in this field ought likewise to be revolutionized. The latter is unfortunately impossible because of our economic conditions and the nature of social progress.

To be more explicit: There are on the one hand various factors in our environment that inordinately stir the sexual passions; there are, on the other hand, social and economic factors that will not admit of satisfying what might even be called the normal sexual desires. Among the former we may mention great tension of sex irritation, unavoidable in certain conditions of life, as for instance in courtship, and which cannot at once be released. It is only necessary in this connection to consider that even marriages that take place in what we call early youth are really several years after puberty. Again how many human beings experience none but abnormal irritations in their sexual life! These may be aroused and stimulated by obscene books and talks, by thrilling scenes in theaters, cabarets and movies, even in the streets. Furthermore, unsatisfied cohabitation, onanism, excessive sexual intercourse, all the possible methods of preventing conception in this day and age, cause nothing but sexual irritation. Any of these may bring on metropathy.

Concerning coitus interruptus as cause of this disorder, Hugo Salus has in particular expressed himself in no uncertain manner. He could see pathologic changes appear with this abuse, and disappear with the restoration of normal conditions.

To explain these harmful effects, we must analyze the process of cohabitation. This consists of several acts: First, erotic preparation and erotic moistening of the vestibular glands; second the subsequent erection and ejaculation of the semen. The last named corresponds to the female orgasm. For normal progress of the sexual process, syn-

chronous action on the part of both orgasms is a necessary basic condition. In case no female orgasm occurs, or if in any way the synchronous action mentioned is interfered with, then the necessary exudation in connection with the physiologic blood and lymph inundation of the genital organs does not ensue. The result is chronic sexual hyperemia and hyperlymphia of the organs of the small pelvis and subsequent transudation and proliferative processes. In place of well-mated activity, the asynchronous orgasm develops sexual disharmony and ill-mated activity on the part of the female.

Another source of danger lies in the daily vaginal douche, supposedly a measure to ensure particular cleanliness. However, this practice will eventually harm the organ which ought not to be touched in this way. Summing up we readily see that there are enough local irritants all through the organism, and that in the end they must evoke a local reaction of the sexual organs. Evidently even very general factors, such as a mere temporary change in occupation, residence, habits of life, etc., influence menstruation. Psychic alterations also react on the bleeding, and as is well known, mere thinking of the sexual organs or their activity can produce abnormal secretions of the uterus. Hence the unnatural sexual life of our women presents an infinite number of conditions conducive to abnormal functioning and bleeding, and productive of uterine secretions and pain. That more women are not suffering with metropathy is due solely to their powers of resistance.

From the point of view of the above discussion, I must say that the term "metropathy" though chosen for other reasons, is highly applicable to the functional disturbances it denotes. If one would care to add to this colorless term a descriptive word indicative of the cause, one might say "parachrestie" (Hugo Sellheim), that is metropathy due to perverted sexual life. For as modern woman cannot permit the uterus and its appendages to carry out their natural functions, their organs suffer markedly from the characteristics of the age, whose worst feature is unnaturalness, that is, pervasion of nature.

To be sure, if the uterus is to be healthy and is to function properly, it requires sane and adequate exercise. In this it resembles the other organs of the body, which all react and become sick if not properly exercised, or if their functions are misused or suppressed. Although nature possesses a store of patience, although, as is well known, the normal endometrium will withstand a long series of abuse, yet all the organs will react to violence and will exhibit functional disturbances, which sooner or later always find expression in local pathologic-anatomic changes. Now when the uterus is prevented from functioning, when it is not allowed to bear fruit, it cannot attain the climax of its functional activity. It remains undeveloped and stunted for life, while the woman herself, when forced into sterility, is deprived

of the full enjoyment of life, and of her bodily and spiritual endowments.

Moreover, when the female orgasm is absent for months and years, we have a source of various well-defined pathologic-anatomic changes. Symptoms arising from the pelvic organs develop, likewise many forms of pruritus vulvae and vaginitis, also chronic induration of the uterus and so-called parametritis posterior, hyperplastic endometritis, retention cysts in the cervical glands, varicosity of the broad ligaments, and many disorders due to reflex action. To this lack of exercise on the part of the uterus may be attributed, in addition, many cases of sterility and dysmenorrhea, also the formation of retention cysts in the ovaries, including small cystic degeneration, and follicular and corpus luteum cyst formation. This lack of exercise brings on, above all, the formation of myoma, which is most closely connected with a chronic sexual irritant (hyperemia and hyperlymphia). Moreover, every woman troubled with myoma suffers from a greatly disturbed sexual life in the sense of being ill-mated or of practicing excessive masturbation, while a well-mated woman is never afflicted with myoma of the uterus. In addition, chronic sexual hyperemia, by irritating the sympathetic nervous system, leads to a whole trail of nervous, more especially, vasomotor symptoms. Many cases of sympathetic neurosis, neurosis of the stomach, of the intestines, and of the heart, also many cases of sexual neurasthenia and hysteria are to be explained in this manner.

Mrs. K. W., age twenty-nine, of high social standing, excellent education and culture. Her father was a lawyer and died at the age of forty-eight from an automobile accident. Mother living and well. One brother married and has two children, another brother has been married recently and has no children. Patient has had the common diseases of childhood but no operations or accidents. Her habits are good and she is fond of outdoor exercise. She is the secretary of a wealthy manufacturer and has great responsibilities in carrying out her duties. Her working hours are seven a day, but at the end of the month they are usually ten to twelve hours daily. Her husband is a civil engineer but his position is not a very lucrative one. They both have to work in order to make ends meet and keep up their social position. She is in constant fear of losing her position, if she should get pregnant. Their income would then be greatly curtailed. Her menstruation was normal and regular before marriage, of the twenty-eight-day type, no dysmenorrhea, leucorrhea or any other abnormality. Married at the age of twenty-three, they always employed contraceptives in the form of coitus interruptus. She also uses a douche after each coitus, and is in constant fear during each coitus that she might become pregnant. At present her bleeding is atypical, of the hypermenorrhoeic type for the last two years, accompanied by pain before and after menstruation; leucorrhea is present and there is intramenstrual spotting. She was never pregnant as far as she knows. Her uropoietic system is normal with the exception of frequency the last six months. Dyspareunia is experienced lately. Her bowels are constipated of late, and she is very nervous. The physical examination reveals a chronic endocervicitis and a nonspecific vaginitis. Uterus and adnexa very sensitive

to the touch but otherwise normal. She is sick in body and soul. It was pointed out to her the perverted sexual life she was leading and pregnancy was advised. Fifteen months later she was delivered of a healthy child and all the symptoms subsided.

That all this is really so, is proved by the fact that when painful coitus, or dyspareunia, is replaced by normal coitus, or eupareunia, all these manifestations and disturbances disappear almost instantly. My case, quoted above in similar connection, is a good illustration of this. Moreover, incredible though it may seem, even retention cysts will vanish completely when a woman becomes well mated. The explanation is quite reasonable when one considers that such cysts have arisen by transudation in conjunction with excessive blood and lymph supply.

To be sure the uterus may not at once present tangible changes, such as hyperplasia of the mucosa, thickening of the walls, myoma, etc., yet the abnormal functioning of its circulatory and glandular apparatus is evident. The cervix, moreover, reacts in its own way to any violence it is made to suffer. It does so by bleeding, by chronic endocervicitis, and by leucorrhea.

Although there are also certain weak congenital constitutions subject to metropathy, due rather to exhaustion than to any misuse, we may say that nearly all cases of metropathy have their origin in a misuse of the female reproductive organs and that there are very few cases demanding a different etiology.

To summarize our discussion, let us again refer to our distinction between endometritis proper and metropathy. We may distinguish two kinds of abnormalities.

1. The one class, whose causes are clearly definite organic irritations which produce a structural and functional pathology. This is true endometritis.

2. The other group, metropathy, with functional and subsequent structural pathology, which originates for the most part in the perverted sexual life of woman, with its consequent abuse and misuse of the uterus, and the genital functions in general.

In this second type the entire organism and psyche in their social setting produce a functional disturbance of the organs of reproduction. When these organs, intended to spend their vitality in a proper manner, i.e., in their reproductive functions, are subjected to violence through abuse and improper function, they react with abnormal bleeding, discharge and pain.

Except in their initial stages, it is impossible to distinguish clearly between metroendometritis and metropathy, for they are in reality but two aspects of the same disease. In the former the starting point is found in local anatomic changes, which in the end, produce functional disturbances. In the latter, metropathy, the disease begins

with functional disturbances, which, sooner or later, produce definite local anatomic changes causing injury to the organs. It is no wonder that the prevailing confusion has arisen, for at one extreme we find structural disturbances in the mucosa and in the musculature with or without attendant functional disturbances, while at the other extreme we come upon functional disturbances without apparent structural injury. Yet each extreme tends to progress toward the other, in between lie all the possible transitional stages, our only distinction being the etiologic factor.

Yet this etiology is extremely important, and we may well ask: "Which has first undergone changes, form or function?" For this problem is of great therapeutic significance. If the disease begins with local anatomic changes, we can determine whether these factors are removable, and a cure may be effected. If, on the other hand, the cause is a misuse of function, the treatment must include an attempt to readjust the patient's sexual life and to restore the natural functions. In the second case the point of attack in an effective therapy would thus shift completely. When, as often happens, functional change antedates structural change, the physician ought to reconstruct the course of the disease's development and progress if he would gain the proper insight and apply a rational therapy at the earliest moment.

In metroendometritis, which begins with local structural phenomena, the diagnosis must be based upon bacterial and histologic examination, and local treatment is called for. This must, of course, be applied before the functional disturbances have gained foothold, and before general constitutional symptoms have developed. In metropathy, on the other hand, the diagnosis and treatment must proceed from the general functional disturbances which, per se, involve social factors.

The physician would realize the justice of the treatment suggested, if the motley array of ever-changing pictures presented itself to him in the proper order, revealing clearly the etiology with reference both to the anatomic and the functional disturbances. Heretofore, the difficulty lay in the circumstance that we were not well acquainted with the functional pathology nor with the idea of seeking the cause in the disturbed function itself when it did not result in any structural change of the organ. But once we grasp this, every difficulty will vanish, it will be an easy matter to consider the mere functional disturbances of the uterus expressing themselves in leucorrhea and irregular bleeding.

In view of our discussion, we must to a great extent remain pessimistic as to a satisfactory solution of the problem. Its general background is the inevitable disharmony between the individual as a static biologic being, and society, constantly changing and progressing. It does not help us in our particular problem to assert dogmat-

ically that women should marry early and bear as many children as they possibly can, for that is a primitive social life to which civilization will never revert.

But certain factors in the social aspect of the problem are capable of some change and consequent amelioration. It is of great importance to society that women should produce normal children, and therefore our problem is even one of public welfare. So far as the physician is concerned, it is his duty in treating metropathy to explain the nature of her sexual maladjustment clearly to the patient, so that she herself under his advice may attempt a normal readjustment; but part of the problem belongs to the sociologist, who can derive much data from the investigations of the physicians. This is obviously proved by the fact that metropathy is to a great extent the product of our industrial order, as is evidenced by the great extent of the disease among women workers.

The physician must be aware of the social factors implied in the etiology of metropathy, if he would solve satisfactorily those cases which come to his attention. But the social theorist, too, will find it of great value in his studies to secure the data of the physician. Perhaps, then, between the two, a satisfactory study can be completed and a fairly adequate compromise effected.

300 ROWENA ST.

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## ROENTGEN RAY TREATMENT OF BENIGN GYNECOLOGIC DISEASES\*

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WHEN approximately sixteen years ago we began in our clinic to treat hemorrhages of benign gynecologic diseases with x-rays, it was our aim to bring about a permanent amenorrhea by annihilation of all ovarian function. This, at first, could be accomplished only in very few cases and then only after long continued treatment. Repeated radiations at intervals of several weeks were required. Thick abdominal walls, extreme youth of patients, or other unfavorable conditions at times forced us to resort to radical operation after failure with radiation. However, as apparatus, especially the tubes, and our technic improved and experience increased, we soon learned to overcome all obstacles. Thus, we finally succeeded not only in procuring the desired amenorrhea in every case including younger women, but even with a considerable shortening of the duration of the x-ray application. Even this did not seem entirely satisfactory and we then aimed to suppress menstruation only temporarily, or

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merely to reduce the monthly blood loss without actually stopping it. This task was solved as soon as we had discovered means of measuring the x-rays and of determining exactly the required dosage.

While occupied with this work we discovered that very small doses do not weaken or destroy the function of the ovaries but indeed actually stimulate these organs. We succeeded in restoring menstruation in cases of amenorrhea and then occasionally observed a pregnancy in patients in whom sterility seemingly was due to ovarian hypofunction. In a clinical sense we thus were justified in concluding that in these cases the reestablishment of a normal ovarian activity must be the result of an x-ray stimulation. Thus encouraged, we treated systematically young amenorrhoeic women in larger numbers and by careful observations ascertained that ovarian stimulation by means of the x-ray not only causes menstruation to become more regular and more normal in amount but that in many instances it would lead to pregnancy ending in full-term labors. There remained the difficult question whether children born by radiated mothers might not exhibit some untowards effects, since all physiologists agree that the x-rays represent a very potent poison to germ plasm, even stronger than alcohol or syphilis, with whose harmfulness on the progeny we are thoroughly familiar.

A series of animal experiments, made by various investigators, led to the following conclusions: There is a great likelihood of premature interruption of pregnancy. The young do not exhibit evident defects, but they show retardation in development in comparison with other animals of the same age. They are weakly and less resistant. In the second generation, the young of these animals are strikingly small and sterile, also deformities are observed. Obviously the results of these experiments on animals cannot be directly applied to the human, and yet there is this one noteworthy fact: Deformities seemingly are not seen in the direct offspring of the radiated mother animals but only in the second generation. Thus, the final decision whether a similar damaging effect, evident only in the second generation, might occur also in the human, will have to be delayed for many years to come. Extensive experience with the effect of x-rays on women so far has shown the following facts: There is evident the same tendency to abortion as is found in animals, the frequency of abortion being from two to three times that of nonradiated mothers. The children often exhibit retardation in bodily development, a high death rate in the earlier months of life, and a high morbidity. This striking similarity with the results of animal experimentation must make us apprehensive of a possibly more deleterious effect that might manifest itself only in the next generation. There can then be no doubt that we had better exclude from radiation all those women for whom the possibility of subsequent pregnancy exists, which prac-



tically means, the exclusion of all women not yet near to or in the climacterium. If x-rays are applied to younger women it, therefore, must be done in a way which precludes any possibility of the rays directly striking the ovaries. Only in this manner can any possible injury to progeny be definitely eliminated.

The first step in this direction was the radiation of the spleen. As early as 1923, I reported my observations on spleen radiations in 80 cases, and since that time this form of radiation has become a permanent addition to our gynecologic therapy. The effect of spleen radiation on hemorrhages was accidentally discovered by R. Stephan in 1920, when he tried it in two cases of fulminant purpura and was surprised by the striking effect. Stephan found that radiation increases the coagulability of the blood and ascribed the phenomenon to an irritating effect of the rays on the reticuloendothelial apparatus. However, this explanation cannot be maintained any longer. It is rather generally assumed at present that blood coagulability is enhanced by the liberation of larger amounts of coagulation-promoting ferments through the destruction of blood cells and especially lymphocytes, which, of course, is best achieved in the spleen which contains them in large amounts. We are dealing with a kind of protoplasma activation.

Changes in the blood produced by spleen radiation manifest themselves within a very few hours. They persist for two or three days and then slowly disappear. For this reason spleen radiation is principally employed for prompt stopping of hemorrhages without expectation of a permanent curative effect.

The technic of this type of radiation is very simple. Above the area of the spleen, established by percussion, a field is drawn, 15 cm. long and 10 cm. wide. Radiation is carried out with the patient lying on her right side, with same apparatus, tube, and filter as used generally for intensive radiation. Focal distance from skin is 40 cm., the dosage measured on the skin is one-third of the erythema dose.

The cases thus treated by us comprised all kinds of hemorrhages in benign affections: puberty hemorrhages in young girls; hemorrhages with adnexal masses; miscarriages; climacteric metrorrhagias; hemorrhages from fibromatous uteri or presumably due to endocrine disturbances of the ovaries in the absence of definite pathologic findings.

In most of these cases various forms of treatment, and different medicines had been previously tried without success. In 70 per cent of the cases a favorable effect followed a single spleen radiation, that is, the hemorrhages ceased entirely or almost so. In those instances in which the hemorrhages could not be influenced, radiation was repeated after a few days, but results of repeated radiations were not satisfactory.

Since not only momentary but permanent successes had been reported by some authors in the sense that, for instance, excessive menstrual flows were lessened for a long time or permanently, or when menses came too frequently, the intervals were lengthened, we studied our material from this viewpoint. We found that one can hardly speak of permanent results of spleen radiation in this sense. Of course, it often happens that later inquiry reveals that the type of menstruation had become normal, but the more acceptable explanation of this occurrence is, that spleen radiation had removed a temporary disturbance and that normal conditions in the meantime had established themselves.

We also made some experiments with spleen radiation in obstetric work. Stephan had recommended this procedure for hemophilic patients, preceding operation. The results were extremely satisfactory. In a similar manner, we thought that in cases of placenta previa a spleen radiation might reduce the anticipated severe blood loss of labor. These experiments, however, proved unsuccessful, as might have been expected. In these cases the severe hemorrhages are actually caused by the opening up of many and large blood vessels, a disadvantage not entirely to be counteracted even by increased coagulability of the blood. The control of hemorrhage under these conditions is dependent more on compression of the vessels by the contracting musculature than upon the prompt formation of thrombi. More noteworthy are the successes in cases of melena neonatorum. We have a long series of such cases with severe melena and vomiting of blood, where a single radiation of the spleen for only five minutes caused, without any other therapy, the immediate cessation of all hemorrhage with recovery of the infants. For this type of case spleen radiation surely will find its permanent place in therapeutic efforts.

The prompt effect of spleen radiation renders the procedure particularly valuable in metrorrhagias from fibroma or incident to the climacterium. Intensive local radiation in these patients is often followed, once or twice, by hemorrhages severer than before. Especially in cases in which hemorrhages have occurred for some time and the patients have become critically anemic, this chance of further increase of blood loss might induce some physicians to give preference to operation over radiation. It, therefore, is our rule to instruct patients after intense local irradiation, to return to the clinic if the next flow is profuse, and if we feel that we can prevent further blood loss by one additional radiation of the spleen.

In cases in which spleen radiation proves a failure, x-rays might be applied to the liver, as first recommended by Borak. The procedure is carried out in the same manner. We have repeatedly succeeded with radiation of the liver after failure with the spleen. Also

in this type of application the effect is ascribed to the large amount of blood present in this organ.

With intensive radiation of the ovaries not only the external secretion of the organs, i.e., the ovulation process, is stopped, but also far-reaching effects are obtained on their internal secretion, as indicated in the appearance of the typical menopause symptoms. It might be mentioned in this connection that an attempt has been made to explain the results of radiation of the spleen or the liver on the basis of some effect on the endocrine function of these two organs which somehow stands in correlation to ovarian inner secretory activity. But as stated before, there is, at present, no doubt that all effect is limited to the influence of the rays on the blood itself and the sources of its origin, respectively. During further attempts to replace ovarian radiation by application of the rays to other organs, it was found that a definite influence upon endocrine ovarian activity can be obtained by such irradiation, though never reaching the ovaries themselves. Search along these lines was based on the knowledge that there exists an interrelation between all endocrines in general, and between the hypophysis and ovaries in particular. This information had been gained in experiments which showed that removal of the hypophysis in young animals retards the development of their genital organs and furthermore causes marked changes in physiologic processes, ending in peculiar pathologic symptom complexes.

In this connection we may well remember the changes in the hypophysis noted during pregnancy and the puerperium, as well as disturbances in the genital functions commonly observed in connection with disturbed hypophyseal activity and especially in cases of acromegaly. Hofbauer was the first to recommend radiation of the hypophysis in the treatment of gynecologic diseases (1922), and he reported good results in uterine hemorrhages from myoma or in the climacterium. Thus was pointed out a new way of influencing ovarian function by rays. It was furthermore ascertained that this procedure was not harmful to the patient, which is not surprising in view of the known fact that brain tissue is strikingly insensitive to x-rays.

In our clinic we administered small doses to the hypophysis in cases due to hypo- or dysfunction of the ovaries. A field is outlined, 2 cm. by 2 cm., about at the center, between the outer circumference of the orbit and the anterior boundary of the external auditory meatus, and this area on either side of the head is given one-third of the skin erythema dose. In the largest number of cases we could not discover the slightest injurious effect on the patient. There are no unpleasant symptoms connected with this procedure. Some few nervous women might complain of slight headache which, however, always disappears promptly. Nausea or vomiting was hardly ever encountered. If these applications are repeated at short intervals

hair might be observed to fall out, but it soon begins to grow again in this area. We began to treat some cases of dysmenorrhea and amenorrhea and met with some surprising results. Pain, severe enough to defy all types of treatment, including surgical, and requiring the administration of morphia, disappeared completely after radiation. But, to be sure, the result was not always permanent. After six or eight months, often sooner, the trouble recurred, but another radiation of the hypophysis without exception again brought the desired relief. The same prompt effect could be seen in the amenorrhoeic patients. Often only a few days after the treatment a uterine hemorrhage appeared, which recurred at regular intervals. Radiation usually proved a failure only in women near forty, or in whom the amenorrhea had persisted over three years, or in whom marked changes of the uterus could be discovered. In women in whom menstruation occurred at short intervals or was too free, radiation often led to decided improvement. Later we began to treat marked climacteric symptoms, following natural or operative menopause, or ovarian radiation, with the administration of x-rays to the hypophysis, and obtained surprising results—often in cases that had been refractory to every kind of treatment, causing the sufferers to become despondent. However, no effect could be seen in actual post-climacteric psychoses.

In time we extended this treatment to gynecologic conditions, not obviously due to endocrine disturbances, such as leucorrhea, pruritus vulvae, etc., and again we often saw improvement and even permanent cures.

Also in obstetrics, radiation of the hypophysis finds its useful field. Some have claimed a relation of certain types of pregnancy toxicosis, especially of hyperemesis and hypersalivation, to disturbed inner secretory function, and a similar etiologic relation has also been suggested for pruritus and other dermatoses. Application of x-rays to the hypophyseal region has led to improvement or cure in many cases of this type. It is probably only the rapid and tempestuous course of eclampsia which so far has excluded these patients from more extensive study of the effect of this form of radiation on them. But I have but little doubt that the procedure some day might be found very beneficial at least in the prevention of such an exaggerated state of toxicosis.

Though very effective in most cases of dysmenorrhea, amenorrhea, or climacteric molimina (for the latter Borak claimed 100 per cent success), radiation of the hypophysis, like any other potent therapeutic measure, will be found to leave certain particularly refractory patients unaffected. In some of these instances it has been found that the desired result can still be obtained by applying the same dose of x-rays to the thyroid. This seems plausible, because in these various

anomalies a disturbed ovarian function is not always, necessarily, the causative factor. The result of the treatment seems to be dependent upon the application of the x-rays to the organ actually responsible for the disturbance. It might be possible in the future to ascertain with greater certainty the one responsible gland or organ, thus enabling us to select the region most appropriate for application of the rays.

As a matter of fact the cases in which radiation of the hypophysis fails while that of the thyroid succeeds, seem to be those which exhibit some of the characteristic signs of hyperthyroidism (decrease in weight, nervousness, rapid pulse, tremor, tendency to perspiration, etc.). It seems certain that further studies and observations will enable us at a future date to select more correctly the gland which should be exposed to the rays, and it might be a gland heretofore not considered in connection with this therapy.

Naturally, we employ x-rays in our clinic for other benign genital diseases as well, and send the rays directly against the vulva in cases of pruritus, kraurosis, or condylomata acuminata, but these procedures lie outside of the scope of this paper, in which I endeavored to show how, during the past few years, our ideas concerning the usefulness and technic of x-ray application in benign gynecologic diseases have gradually changed, and in which directions further progress with this therapy might be expected in the near future.

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## UTERUS DUPLEX BICOLLIS, VAGINA SIMPLEX, AND SUPERFETATION

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THE urogenital system, although the youngest philogenetically, is probably the most complicated of the whole human organism. Since these two factors, philogenetic youth and intricacy of structure, inherently cause vulnerability, it is not surprising that malformations of the uterus are rather frequent. While today we can logically classify the various anomalies of uterine formation, we are still in the dark regarding their actual genesis. We know from our study of embryology that a double uterus is caused by a lack of fusion of the genital ducts but can advance no convincing reason why the müllerian tissue does not unite in a given case. The explanations offered by different investigators vary widely and a brief review of the literature will be of interest in showing the more important theories on this subject. In his monograph von Winkel<sup>1</sup> gives various reasons for uterine anomalies and cites disturbances of development

of the intestinal tract, bladder, or a cystic allantois. He also mentions Graetzer's theory, who believed that fetal peritonitis was responsible for uterine malformations. The latter cause, however, can certainly be accepted for only a very few cases. Krieger,<sup>2</sup> Kussmaul,<sup>3</sup> and a little later Fuerst,<sup>4</sup> credited the rectovesical ligament with the production of double uteri, because this ligament is sometimes found between the two horns of a single uterus or between a double uterus. Undoubtedly, however, this ligamental anomaly is not the cause but only a concomitant further structural change as Kermauner<sup>5</sup> has pointed out. The latter makes an abnormal persistence of the cloaca responsible for the separation of the genital ducts. Felix<sup>6</sup> and also Rosenstein<sup>7</sup> have a somewhat similar theory and state that formative disturbances of the intestinal tract and developmental errors of the ventral abdominal wall are the deciding factors in these cases. This view is perhaps correct in some instances inasmuch as von Franqué<sup>8</sup> has reported four cases which apparently substantiate this conception. Differing from the previously mentioned investigators, Pick<sup>9</sup> held that interference by stray cells of müllerian tissue or a tumor "anlage" may keep the ducts apart. The absence of tumors in most cases of double uterus, however, speaks against such an assumption. Pfannenstiel<sup>10</sup> was of the opinion that a primary broader anlage of the lower part of the trunk might cause failure of union of the müllerian ducts and R. Meyer<sup>11</sup> believes that double uteri may be the result of an originally too great separation of the ilioinguino-diaphragmatic ligaments, or that too short round ligaments might cause a torsion and separation of the müllerian structures.

An abnormal separation of the ligamentary apparatus in itself, however, does not always cause double formations of the uterus, as I myself have operated upon a case for fibromyomata uteri and ovarian cyst in which both round ligaments were inserted three-quarters of an inch away from the uterine cornua into the tubes. Except for their insertion the ligaments were normal in appearance and length. One might of course say that I was dealing here with a bicornate uterus and that the apparent tubal portions between the uterus and the round ligaments were really uterus. At the same time the uterus, except for the fibromyomata, was normal in every way as were likewise the tubes, and histologic examination showed typical tubal structure in the portion of the fallopian tubes between the uterus and the round ligaments. The fibromyomata themselves of course could not have caused the abnormality of the round ligament insertion.

Probably the theory originated by Thiersch<sup>12</sup> that a marked development and longer persistence and greater separation of the wolffian bodies may cause double formations in the female genital tract, is as plausible as any; Frankl<sup>13</sup> in his studies on the round ligament also has shown that the shortness and thickness and wider separation of

the round ligaments so common in cases of double uterus (cases of Frank,<sup>14</sup> Holzbach,<sup>15</sup> Meyer,<sup>11</sup> Pfannenstiel,<sup>10</sup> etc.) are not the result of the double formation but a deciding factor in its development. Of course a longer persistence of the wolffian body will cause a short round ligament and such a ligament may indeed prevent a union of the müllerian ducts. At the same time this is really carrying the process back but one step and we still do not know why the wolffian bodies should show the changes described. Judging from the numerous cases of double uterus reported and the described findings in each it seems probable that varying factors are at work and that there is no one uniform etiology for all cases of double uterus. Perhaps, too, von Winkel<sup>1</sup> is correct in assuming that besides purely mechanical factors there are also inherent attributes of the germ plasma itself to be reckoned with.

The following case, while it presents nothing new, appears to me to be of sufficient interest to be reported in the literature because of the superfetation which occurred in the physiologically adequate double uterus.

CASE 1.—A. M., Italian woman, thirty years old, who had been married three years and had no previous operations. Menstruation began at seventeen years and was always normal. She had one child two years ago, which is living and well. Her second pregnancy is described below.

The patient was first seen in July, 1925, complaining of vaginal discharge and backache since her last confinement two months before. At that time she gave birth to a seven months' child (now living and well) and three days later again having labor pains, passed something which an experienced midwife informs me was a three months' old fresh fetus in its membranes. After this the patient made an uneventful recovery.

Physical examination showed a well-nourished woman with normal palpatory abdominal findings, normal external genitals, normal single vagina, but two cervices, both rather short and somewhat eroded and both showing a moderate transverse laceration. The cervices were situated side by side and united only in the midline by a sagittally disposed fibrous band about 2 to 3 mm. broad. Two uteri were felt, one to the right and the other to the left of the median line, diverging from each other at an angle of about 45 degrees. The left uterus, measured with a sound, was 9 cm. long and the right one  $7\frac{3}{4}$  cm.

The patient was treated a few times, after which she stayed away and was not seen again until the beginning of 1926. The erosions of the cervices were less marked now than six months before and the discharge and backache improved. The left uterus now measured 8 cm. in length and the right one 7 cm.

Because nephritic malformations often accompany uterine anomalies, a cystoscopy was done but showed only a perfectly normal bladder with two normal ureteral openings. An x-ray was refused by the patient.

Aside from the double uterus in this case we have the history of a previous normal single pregnancy, and now of a double pregnancy with the fetus of widely different ages. Since both of the uteri were of normal size and both showed a laceration of the cervix, we must consider them both as physiologically adequate.

The question remaining then is that of the superfetation. We can almost certainly assume that superfetation actually took place in this patient as the second fetus was fresh and not compressed or mummified as it would have been had both pregnancies begun simultaneously in the same uterus and one of the fetuses been overwhelmed by the development of the other: This of course disregards the practically negligible possibility of the two pregnancies beginning synchronously in each of the two uteri as there would be no assignable reason for the difference of development of the two products of conception. The point to decide is whether the superfetation occurred in the same uterus or not.

Superfetation, perhaps because of its rarity and also possibly for its legal aspects, has often occupied the minds of obstetricians and has been held possible even with single uteri and uterine pregnancies. In such cases, however, the second impregnation must be accepted as taking place before the first ovum occupies the uterine cavity, or has filled it to any appreciable extent. Both fetuses therefore must approximate one another in age. This being true, a diagnosis of superfetation is very difficult because developmental peculiarities, for instance, diminished blood supply to one fetus, may be responsible for a difference of growth of any two fetuses, even though they in reality date from the same impregnation. I believe that many of the cases of so-called superfetation in a single uterus with two uterine pregnancies of apparently widely different ages are errors of interpretation and that true superfetation, because of the fact that the two fetuses must closely approach one another in age, may go unrecognized. At the same time it must not be forgotten that superfetation even in the early stages of pregnancy must be rare because usually the corpus luteum formed at pregnancy will inhibit the development of other ovarian follicles. As a result, superfetation can theoretically occur only at a time when the action of the corpus luteum has waned, that is, around the fourth to fifth month. This supposition agrees well with my case but must necessarily render superfetation in a single uterus practically impossible. True superfetation may, however, occur in cases of a primary ectopic gestation with secondary uterine gestation, or in double uteri, and such cases have been reported in the literature (Buyaski,<sup>16</sup> Cassan,<sup>17</sup> Trapet<sup>18</sup> and others). Even then, however, superfetation must remain rare because of the unusual nature of the conditions prerequisite for its occurrence.

In view of the just mentioned considerations, the history and the physical findings of my case, both two and eight months after confinement, I think we can safely say that we are dealing with a true case of superfetation in a double uterus. Judging by the size of the two uteri it also seems probable that the superfetation occurred in the right uterus.



Clinically there is little to be said of such cases. As might be expected dystocia is common, also premature labor, especially as regards the second product of gestation. The question as to whether in a case of double uterus with a pregnancy in one side, the other uterus would menstruate, must be answered generally with no. In ectopic gestation menstruation practically always ceases, as the decidua forms even though the uterus is empty, and the same will apply to the empty horn or side of a singly pregnant double uterus.

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30 EAST 58TH STREET.

## VICARIOUS (SUPPLEMENTARY) MENSTRUATION, WITH THE REPORT OF A CASE

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NORMAL menstruation is a phenomenon, the exact cause of which has never been satisfactorily explained or thoroughly understood. Even more perplexing are those instances in which there is extra-uterine bleeding coincident with the menstrual flow, or complete substitution in some other organ of this natural uterine function.

The most unusual type of extrauterine bleeding accompanies the regular monthly period and occurs while the uterus is functioning. Far less common is the case where a true vicarious menstruation takes place, apparently in an effort to compensate for the loss of this uterine function.

Condit's<sup>1</sup> report is a classic example of the latter type. Following supravaginal hysterectomy and bilateral oophorectomy, his patient bled into a nevus of the chest wall. The hemorrhage occurred regularly every twenty-eight to thirty-four days for twenty-one months and was accompanied by the usual premenstrual symptoms and moulins. The nevus finally ruptured and was excised. Following this there was a hemorrhage into the left breast every month, the breast increasing in size and always subsiding between periods. After a year all bleeding stopped for six years when it was again manifest by extensive ecchymoses on both thighs, which recurred at irregular intervals for several months.

The case is of particular interest because both ovaries had been removed and, unless supernumerary tissue was overlooked, it occurred without ovarian influence. It is to be regarded, therefore, as an attempt on the part of the body to compensate for the loss of the uterus.

While vicarious menstruation is generally regarded as a disturbance of, or due to, an increased ovarian function, it is difficult to understand why it does not occur more frequently after hysterectomy without removal of the ovaries. It is generally admitted, however, that removal of the uterus results in ovarian atrophy, but in such cases the process is gradual and the symptoms of menopause are usually absent.

In proof of ovarian influence Rosser's<sup>2</sup> case may be cited. In this instance bleeding occurred regularly from the conjunctiva and the ear, and was stopped only after bilateral oophorectomy.

Other cases are apparently due to deficient ovarian function as

witnessed by the patient of Funk and Ellis<sup>3</sup> in whom there was periodic bleeding from the mouth associated with hypoplasia of the uterus and tubes and aplasia of the ovaries and breasts.

Ocular manifestations of vicarious menstruation are common and the literature on this phase of the subject has been reviewed by Gleason.<sup>4</sup> The cases reported are either those of conjunctival congestion, subconjunctival hemorrhage, retinal hemorrhage, or bleeding into the anterior chamber. A report in which there was an escape of blood from the eye without subconjunctival ecchymosis cannot be found in the literature.

Many cases might be cited from the literature, but in spite of the frequent reports, the occurrence of the condition has been doubted by many careful observers. Surely too many instances of simple epistaxis, pulmonary hemorrhage, and bleeding hemorrhoids have been reported as vicarious menstruation.

Roth<sup>5</sup> in an extensive review of the literature since 1870 found 270 cases of vicarious menstruation. In 30 per cent the bleeding was purely vicarious, and in 70 per cent supplementary. Hemorrhage occurred from the nose in 30 per cent; skin (including fistulae) 10 per cent; lungs 8 per cent; breast, stomach and mouth, each 4 per cent; bladder, eye, ear, kidney, vagina, 0.45 to 3 per cent each.

The case here reported is of interest because of the number of organs affected, the periodicity of its course throughout many years, and its complete and immediate cessation following oophorectomy.

Patient, aged thirty-five, single, referred by Dr. C. W. Strickler, of Atlanta, Ga., entered the Wesley Memorial Hospital December 18, 1925, because of severe abdominal pain following peritonitis. Her father died of pneumonia; her mother is living and well. There was no history of hemophilia or any hereditary disease. She was healthy as an infant and aside from diphtheria, scarlet fever and typhoid was never ill. Menstruation began at the age of twelve and since onset there has rarely been a period when there was not bleeding from some other organ. Uterine flow has, however, been regular, and the supplementary bleeding occurred only at the menstrual periods and never in the interval.

In the early years of her menstrual life there was bleeding from one or both nipples without any swelling or ecchymosis in the breast. On several occasions there was hemorrhage from the gums and cheeks. Often there was severe toothache and bleeding into the root cavities of the upper incisors, necessitating their removal. Some fifteen or twenty pulmonary hemorrhages have occurred, and on this account life insurance has been refused in spite of negative examinations and roentgenograms of the chest. Bleeding from the stomach and bowels has occurred at times. On one occasion there were pin point hemorrhages from the skin.

The most unusual feature was the bleeding from the left eye. The patient stated that this came on without warning and at times there would be as much as a "cupful" of bright red blood. Examination by various ophthalmologists failed to show any bleeding point. Twelve years ago the appendix, right tube and ovary were removed without relief. A year ago a uterine suspension was done and the gall bladder, containing a stone, removed. No improvement followed.

Ten weeks before admission to the hospital, she pricked her finger with a rose thorn and an infection of the hand and arm, requiring multiple incisions, followed. Later symptoms of pelvic peritonitis developed. She was confined to bed and her temperature ranged from 100° to 102° F. During the ten weeks of this illness she lost forty pounds. On admission to the hospital her chief complaint was severe abdominal pain, most marked on the left side.

Examination showed a lower midline and upper right rectus scar on the abdomen. The lower abdomen was tender and the left side spastic. Vaginal examination disclosed a tender mass in the left adnexal region. Blood pressure, 130/85; urine, negative; W. B. C., 10,000; polys., 74 per cent; hg., 60 per cent; temperature, 98° to 99.3° F.

A diagnosis of right tuboovarian abscess was made, but it was thought best to defer operation until this process was less acute and the patient's general condition had improved. For three weeks preceding the operation she was confined to the hospital, during which time she was rarely free of abdominal pain, which occasionally required morphine for relief.

On January 2, 1926, the patient's menstrual period was expected. At this time she had an increase in the abdominal pain, headache, and the usual premenstrual symptoms. During the morning there was a sudden hemorrhage from the left conjunctiva, estimated to be about 30 c.c. This was checked by dropping three minims of adrenalin, 1-10,000, in the eye. No bleeding point and no conjunctival injection could be seen.

The following day menstruation had not begun, but, while I was examining the patient's abdomen, she called my attention to the fact that her eye was beginning to bleed. I thus had a chance to observe this phenomenon from the onset. The blood quickly filled the eye and overflowing the lid ran down the cheek in a steady stream. The conjunctiva was irrigated with saline in an attempt to see a bleeding point, but the hemorrhage was so brisk that this could not be made out. After she had bled about 30 c.c., three drops of adrenalin was instilled and the bleeding immediately stopped. The exact origin of the flow could not be determined. Normal menstruation began during the night of January 3 and continued for five days. There was no further abnormal bleeding.

By January 11 the patient's general condition had greatly improved and it was thought that her condition would warrant operation.

Under gas oxygen anesthesia the abdomen was opened in the lower midline through the old scar. Small intestine and sigmoid were densely adherent to the abdominal scar and in the pelvis, and the adhesions were freed with great difficulty. The uterus was found in good position and normal in size and contour. The right tube and ovary and appendix had been removed. On the left side was a tense tuboovarian abscess, about 6 cm. in diameter, in which ovarian structure could not be made out. This was removed, and the wound closed without further exploration.

Her postoperative convalescence was stormy for the first three days, following which her recovery was normal. She left the hospital on February 4, 1926. At the present time she has gained in weight and strength, is free from pain, and her general condition is excellent. Since operations there has been no bleeding from any organ.

#### CONCLUSION

The case here presented had suffered for twenty years with bleeding from various organs, including the eye. This bleeding was always coincident with menstruation. The cure of the condition by oophorectomy (performed for tuboovarian abscess) apparently proves that

the extrauterine bleeding was a menstrual phenomenon and the result of ovarian overactivity or dysfunction.

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24 DOCTOR'S BUILDING.

## A COMPARISON OF THE CONTENT OF POTASSIUM IN MATERNAL AND PLACENTAL SERUM

BY HARRY BAKWIN, M.D., AND HELEN RIVKIN, M.A., NEW YORK

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THE potassium content of maternal and placental serum, simultaneously collected, was determined by the method of Kramer and Tisdall.<sup>1</sup> This method, though not entirely free from inaccuracies, is more reliable than those methods hitherto used in similar studies. Blood was obtained from the placenta immediately after delivery. Within ten minutes blood was drawn without stasis from the median vein of the mother. The serum was separated within thirty minutes. Both placental and maternal sera were collected under albolene. All the mothers received an anesthetic (either ether or chloroform). Specimens showing the faintest trace of hemolysis were discarded. All the placental sera examined were bile stained.<sup>2</sup>

Edelstein and Yllpö<sup>3</sup> made simultaneous determinations of the potassium content of maternal and placental serum. Their values in 11 cases varied from 28 to 203 mg. of  $K_2O$  per 100 c.c. In 4 instances the  $K_2O$  was over 100 mg. Such wide fluctuations suggest some technical error, probably hemolysis. They state that the blood specimens were defibrinated by shaking with glass beads. The red cells of the newborn are especially easily fractured. Excluding the 4 high figures their average for the maternal serum was 40 mg. of  $K_2O$  per 100 c.c. for placental serum 53 mg. Karnitzski<sup>4</sup> states that the fetal blood is poorer in potassium than adult blood.

In normal adults and children the potassium content of serum is fairly constant, varying by the use of this method between 18 and 22 mg.<sup>1</sup> The values may be slightly increased after the ingestion of potassium salts<sup>2</sup> and in infants with tetany.<sup>5</sup>

The results of the determinations along with other data are shown in Table I. It is at once apparent that the potassium content of placental serum is considerably higher than that of maternal serum. The average for placental serum (38.5 mg. per 100 c.c.) is almost twice that obtained by Kramer and Tisdall for normal children and adults (21 mg. per 100

c.c.). The maternal values show slightly wider variations than those reported by Wilkins and Kramer. The average is 20.7 mg. per 100 c.c.

There is apparently no relation between the potassium content of the serum and the sex, color, or birth weight of the baby or the parity of the mother. That the increased concentration of the placental serum is not due to changes in the serum concentration is shown by the values for protein (Kjeldahl method), calcium (method of Kramer and Tisdall<sup>6</sup>), and chloride (method of Whitehorn<sup>7</sup>).

TABLE I

NUMBER	BIRTH WEIGHT Kg.	POTASSIUM MG. PER 100 C.C.		PROTEIN MG. PER 100 C.C.		CALCIUM MG. PER 100 C.C.		CHLORIDE MG. PER 100 C.C.	
		Plac.	Mater.	Plac.	Mater.	Plac.	Mater.	Plac.	Mater.
1	3.91	35	23	6.6	7.0	11.1	10.7	370	370
2	3.32	26	23	5.5	7.4	10.4	12.4	387	376
3	—	38	20	5.8	7.4	—	—	370	367
4	3.18	33	21	5.4	5.9	11.2	9.3	397	399
5		45	18	6.2	6.0			361	372
6	3.45	38	18	5.7	5.8	11.3	10.0	386	374
7	3.11	23	17	5.0	6.4	12.0	10.2		
8	3.72	23	22	6.5	6.6	11.2	10.0	370	367
9	3.12	51	19	5.6	6.9	10.0	9.4	364	362
10	3.52	42	20	7.0	7.4			381	374
11	2.96	40	20	5.4	6.3	11.5	9.8	374	368
12	2.50	39	23	6.4	7.9	10.1	12.9	366	362
13	3.29	33	24	4.9	5.2	11.0	10.1	359	366
14	3.23	43	25	6.7	7.3	11.2	9.0	368	372
15		35	21	6.1	6.3				
16		38	20	5.8	6.7			362	353
17		49	24	5.5	5.5			362	365
18	2.98	52	19	6.1	7.5	11.3	10.3	367	359
19		40	18						
20	3.58	46	19	7.9	5.7				
Average		38.5	20.7	6.01	6.59	11.0	10.3	371	369

The protein content of maternal serum was usually higher than that of placental serum. This is the usual finding. The calcium content of placental serum was slightly higher than that of maternal serum. The chlorides showed no constant difference.

## SUMMARY

1. The average for the potassium content of placental serum is 38.5 mg. per 100 c.c., almost twice that for normal children and adults.
2. The average for the maternal serum is 20.7 mg. per 100 c.c.

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## SOME OBSERVATIONS ON THE VACCINATION OF PREGNANT WOMEN AND NEWBORN INFANTS\*

BY JOHN A. URNER, B.S., M.D., MINNEAPOLIS, MINN.

(Chief Resident in Obstetrics and Gynecology, General Hospital)

THE severe outbreak of hemorrhagic smallpox occurring in Minneapolis during the winter of 1924-1925, made it urgently necessary to protect the public by means of vaccination.

At the prenatal dispensary we were besieged with questions regarding vaccination during pregnancy; many patients said that other physicians advised them against it for fear of obstetric complications.

Again, in the hospital the necessity of vaccinating newborn infants arose, due to the development of a case of smallpox in the obstetric wards.

As a result, all patients at the prenatal dispensary were vaccinated regardless of the period of pregnancy, and all newborn infants were vaccinated as soon as possible after birth. This work was done under the direction and supervision of Dr. Fred L. Adair, Chief of Division "A," Obstetrics and Gynecology, at the General Hospital, Minneapolis, Minn.

Le Lievre,<sup>1</sup> in 1903, in his discussion of the vaccination of pregnant women and newborns asks the following questions: "Should one vaccinate pregnant women?" "Does this hygienic precaution not disturb the course of pregnancy?" Further, "Cannot the child be benefited by the successful vaccination of the mother?"

He states that experimentation as well as clinical observation has demonstrated the possibility of vaccinating a child in utero and as his authority quotes from *The American Journal of Medical Sciences* of June, 1853, where the first case is reported in which successful vaccination of a mother during the prenatal period imparted an immunity to her child. This consideration was based upon the fact that the child in question was vaccinated several times without a successful "take." In conclusion he states that one may affirm the transmission of vaccinal immunity from the mother to the child and that in an epidemic all pregnant women should be vaccinated to preserve themselves and their children from the danger of smallpox.

Pierrot,<sup>2</sup> in his Lyon thesis of 1904 says, "The course of vaccinia in the newborn is often very benign and does not have the local reaction and fever so often seen in other children. For this reason early vaccination of all infants born at term is advised. There is no reason to believe that the immunity conferred by early vaccination is less lasting than that produced by vaccination done two or three months later. The pretended immunity of the newborn should not be taken into account."

Beauquey<sup>3</sup> comments upon the very mild character of the vaccinal reaction in the newborn. He urges early vaccination because at a later date there may be an eczema present, which he considers a contraindication, or the child may be teething, lowering its resistance and making the reaction more severe.

Cathala<sup>4</sup> reviews the statistics of the vaccination of infants in the maternity ward of Saint Antoine Hospital, Paris. In 673 vaccinations there were 540 positive reac-

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tions or 80.23 per cent. All of these infants were vaccinated during the first four days of life by the method of scarification which he says gives the best results. He states that failure to obtain a higher percentage of positive reactions is due to faulty technic.

Bonnaire<sup>5</sup> reports the vaccination of 532 infants at the Maternité, Paris. These infants were vaccinated the third day after birth. There were 59 per cent positive and 41 per cent negative reactions.

Wurtz<sup>6</sup> advises early vaccination of newborns except in cases of congenital debility, infections, hemophilia and dermatitis. He urges revision of the French law so that legal vaccination may be performed on or after the tenth day.

Camus<sup>7</sup> believes that experimentation and statistics have shown that vaccination is often unsuccessful when done under three months and may be attended by harmful results. He emphasizes his belief that children under three months have nothing to fear from smallpox due to their inherent immunity to all infectious diseases.

Mensching<sup>8</sup> reviews the German work on the subject and gives the results obtained in a large series of his own cases. He quotes Ablatz, Palm, Franz and Kuhner,<sup>9</sup> who in 1915 published a paper based upon the vaccination of 300 newborns. These workers unanimously agree that the well-being of the newborn is not altered by vaccination and with the exception of Ablatz urge vaccination in the early days of life. With reference to the vaccination of pregnant women the above authors agree with the opinions held by Friedberg, Burekhardt, Gast, Behm and others that their well-being is not altered.

Mensching<sup>8</sup> vaccinated 684 newborns, the results being 71 per cent positive and 29 per cent negative reactions. He believes his low figure of successful vaccinations is not due to the low susceptibility for the vaccine but due either to faulty technic or to intrauterine transference of immunity.

The reactions obtained developed on the seventh or eighth day with the formation of a typical pustule, severe local reaction, areola formation and marked infiltration of the skin. Swelling of the axillary glands was a constant feature. Six cases showed a generalized exanthem usually occurring on the ninth day and persisting for not more than two days.

He vaccinated 62 premature infants with a minimum weight of 2300 gm. In these he obtained 64 per cent positive and 36 per cent negative reactions. The course of vaccination in these infants differed and in no way from those at full term.

In regard to the transference of immunity in utero, he states that the number of unsuccessful vaccinations was larger in infants whose mothers were vaccinated during pregnancy by 14.1 per cent, while Kuhner reports this difference as 9.8 per cent. In a series of 206 cases there were 62 per cent positive and 38 per cent negative reactions. In these negative cases there was a possibility of intrauterine transmission of immunity as ten were revaccinated without success. He concludes that intrauterine transmission of immunity is possible but rare and uncertain and should not be relied upon in case of an epidemic.

In our own series the results of the vaccination of 129 pregnant women are here reported. These women were seen in the prenatal dispensary and were vaccinated regardless of their periods of pregnancy. Fresh vaccine was used and worked into the skin by scarification. The period of pregnancy was recorded and the patient directed to return on the third, sixth and tenth days following. They were cautioned to report any untoward effects such as abdominal cramps, vaginal bleeding, etc.



Five per cent of the positive cases showed rather severe symptoms of backache, anorexia and malaise with a rise in temperature. There was not a case of threatened abortion, miscarriage or premature labor.

There was not a single instance in which the course of vaccination differed from the moderately severe reaction obtainable in any other individual. In 20 per cent of these women vaccination had been done elsewhere and this data was obtained at the time of delivery.

In our series of vaccinated newborns, all infants were vaccinated, with but few exceptions, on the third day after birth. They were all vaccinated on the left deltoid region after first cleansing the area with ether and allowing it to dry thoroughly. Fresh vaccine was then applied and in those of Series I worked into the skin by a fine sharp needle, making not more than five punctures 1 mm. apart. In Series II the same preparation was carried out and the vaccine worked into the skin by scarification. Four parallel scratches were made about 3 mm. long and 1 mm. apart. The area was left to dry and sterile dressings applied.

Following the inoculation with the virus, the vaccinated area showed no evidence of reaction until about the fifth or sixth day, when babies that reacted positively developed a small papule, differing from the adult type in that the usual red zone was faint or absent. This evolved until on the seventh or eighth day a vesicle formed with a slight red zone. Most babies showed axillary adenopathy at this time.

On the ninth or tenth day we found the vesicle had enlarged to about the size of a dime and became distended by a thin purulent fluid. This pustule was surrounded by a pearly white margin from 1 to 2 mm. wide and had a rolled appearance. There was very little infiltration of the skin around the vaccinated area.

The pustule now started to umbilicate, usually ruptured, dried rapidly and formed a rather adherent scab which separated about the eighteenth to twenty-first day. Babies observed at the end of six weeks after vaccination exhibited a small, superficial scar which was not at all conspicuous.

Babies having negative reactions presented no change in the vaccinated area and after four or five days it was very difficult to see the puncture or scarification marks.

Three babies having negative reactions were revaccinated. They developed typical positive reactions after the second inoculation. We were unable to obtain further accurate figures on the revaccination of babies as the mothers and infants left the hospital from the ninth to eleventh day. We were further handicapped by the lack of cooperation from the parents.

The effect upon the well-being of the infant, while there would appear to be a severe local reaction, is negligible. They nursed well,

slept well and showed no difference in general from infants not vaccinated.

The normal physiologic weight loss did not seem excessive or prolonged except in a few cases where it was not reasonable to ascribe the cause to the reaction. In general 75 per cent of the babies regained their birth weights by the eleventh day, while those who did not were no slower than many unvaccinated infants used as controls.

The temperature curves did not differ in any respect from the unvaccinated infants. In many showing severe reactions the temperature remained normal; this was the rule and not the exception. There were temperature rises of course but they occurred as often and as frequently in the unvaccinated and could not be directly ascribed to the vaccinal reaction.

The unaffected temperature in vaccinated infants is agreed to by Mensching and others. Mensching believes it is due to the normal physiologic property of the newborn of thermolability. It gives off heat rapidly due to its thin epithelium and preponderance of body surface over body weight. Ablatz explains the lack of fever due to an immunity to the vaccine, while Friedmann says the concentrated blood of the newborn can throw off the vaccinal reaction without the association of fever.

In our series there were two very severe local reactions with gangrene of the area and marked swelling of the axillary glands. These passed off subsequently with no ill effects to the infants. There were no cases showing exanthemata or other generalized reactions.

Unfortunately we were not permitted to revaccinate these babies at a later date in an endeavor to determine the permanency of the reaction. Mensching believes it to be as permanent as in the adult and Wolff states that in his cases vaccinated at birth there has been very little smallpox though there has been much exposure to it.

We do not believe there is a single instance in this series where intrauterine transmission of immunity to smallpox or to vaccination can be demonstrated or thought likely. If there is any immunity transmitted to the fetus in utero it is no doubt passive and not of sufficient consequence to protect the infant from either smallpox or vaccination. Supfle, Von Pirquet and others have demonstrated antibodies in the blood of vaccinated individuals but they were only transitory and of short duration. There is much doubt in the minds of Pfaundler and Mensching as to whether the placenta will transmit these except under very rare and exceptional circumstances, though Mensching believes the greatest possibility lies in mothers having a reaction at least eight days before the birth of the child, as at that time antibodies have been found in appreciable amounts in maternal blood.

From the appended tables it will be seen that we vaccinated 66 mothers from the eighth to the tenth month. Their infants reacted with 66 per cent positive vaccinations. From the first to the eighth

TABLE I  
REACTIONS OCCURRING IN 200 INFANTS VACCINATED

	SERIES I	SERIES II
Total infants vaccinated-----	100	100
Total positive reactions-----	69	79
Total negative reactions-----	30	20
Undetermined reactions -----	1	1

TABLE II  
SHOWING THE TIME OF THE MOTHER'S REACTIONS AND THE REACTIONS OF THEIR INFANTS

MOTHERS' REACTIONS	INFANTS' REACTIONS						
	No.	Pos.	%	Neg.	%	Und.	%
Recent positive	93	64	71.0	29	29.0	0	0
Remote positive*	12	11	91.6	1	8.4	0	0
Simultaneous with infant	26	26	100.0	0	0.0	0	0
Negative or immune	49	29	59.0	20	41.0	0	0
Having had smallpox	9	9	100.0	0	0.0	0	0
Undetermined	11	9	81.8	0	0.0	0	18.2

\*Mothers who had positive reactions several years ago. They had not been re-vaccinated and would not permit vaccination at this time.

TABLE III  
TABLE SHOWING THE PERIODS OF PREGNANCY OF THE MOTHERS WHEN VACCINATED, THEIR TYPE OF REACTION AND THE REACTIONS OF THEIR INFANTS

PERIOD OF PREGNANCY		MOTHERS' REACTIONS				INFANTS' REACTIONS		
Week	No. Vac.	Pos.	Neg.	Imm.	U.	Pos.	Neg.	U.
12	1	1	0	0		1	0	
15	1	1	0	0		0	1	
16	1	1	0	0		1	0	
23	2	1	1	0		1	1	
24	4	3	1	0		4	0	
26	7	7	0	0		7	0	
27	6	6	0	0		4	2	
28	9	6	2	1		7	2	
29	1	1	0	0		1	0	
30	9	2	3	4		3	5	1
31	5	4	0	1		4	1	
32	17	9	5	3		10	7	
33	2	1	1	0		1	1	
34	8	5	3	0		6	2	
35	5	3	1	1		1	4	
36	29	20	2	6	1	18	11	
37	7	5	2	0		5	2	
38	11	7	2	2		7	4	
39	4	2	1	1		4	0	
AD*	41	30	7	4		34	7	
SP not vac.t	7	0	0	0		7	0	
SP vaccinated	2	0	2	0		2	0	
RP†	11	0	0	0		11	0	
Undetermined	10	0	0	0		9	0	1
	200	115	33	23	1	148	50	2

\*Mothers vaccinated after delivery, not from dispensary.

†Mothers gave histories and evidence of having had smallpox. They did not permit vaccination except for the two cases noted.

‡Mothers having a positive reaction years ago. They did not permit vaccination at this time.

TABLE IV

SHOWING THE PERCENTAGE OF THE MOTHERS' AND INFANTS' REACTIONS ACCORDING TO THE PERIOD OF PREGNANCY IN WHICH THE MOTHERS' REACTIONS OCCURRED

PERIOD OF PREGNANCY	MOTHERS' REACTIONS				INFANTS' REACTIONS	
	% Pos.	% Neg.	% Imm.	% U.	% Pos.	% Neg.
1- 4 months	100.0	0.0	0.0	0.0	66.66	33.33
4- 6 months	66.66	33.33	0.0	0.0	83.0	17.0
6- 7 months	85.0	9.0	6.0	0.0	81.0	19.0
7- 8 months	50.0	25.0	25.0	0.0	56.0	44.0
8- 9 months	65.0	15.0	15.0	5.0	59.0	41.0
9-10 months	63.0	22.0	15.0	0.0	75.0	25.0

month we vaccinated 63 mothers whose infants reacted with 71.5 per cent positive vaccinations. In a much smaller group, in fact too small to be of value, were 12 mothers who had positive vaccinations many years ago with no revaccination. Their infants had 91.6 per cent positive reactions.

Thus it will be seen that there are no really significant figures in the two larger groups and from this we feel that the technique of vaccination and the strength of the virus are the most important factors in obtaining positive reactions.

The method of scarification used in Series II gave us 10 per cent more positive reactions than that by puncture used in Series I. It would seem from this that the former is the method of choice.

Immune reactions in the mother were those which, after vaccination, developed some local inflammatory change but did not develop into a typical reaction with the formation of a papule, vesicle, and pustule.

In the infant immune reactions did not occur. They were definitely positive or negative.

From the above there do not seem to be any really significant figures. It would seem, however, that if intrauterine transmission of immunity was an important factor we should expect a smaller number of positive reactions in infants whose mothers had positive reactions in the later months of pregnancy. The above figures do not tend to bear this out.

#### CONCLUSIONS

1. Pregnant women may be vaccinated at any time during their pregnancy without fear of obstetric complications. It would seem advisable, however, to set aside this precaution in cases of hyperemesis, hypertension and albuminuria.

2. Newborn infants should be vaccinated early. They bear the reaction well, in fact better than when vaccinated later. The more robust premature infants should be vaccinated when necessary; though we have no figures on these infants, Mensching's are signifi-

cant. Failure to obtain nearly 100 per cent positive reactions would indicate faulty technic or poor virus.

3. Intrauterine transmission of immunity to smallpox should not be taken into account as at best it is passive, slight and infrequent and not of sufficient consequence to protect the infant from either vaccination or smallpox.

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GENERAL HOSPITAL.

### PROTECTION OF THE CERVIX UTERI DURING LABOR\*

BY ARCHIBALD L. McDONALD, A.B., M.D., F.A.C.S., DULUTH, MINN.

SERIOUS and extensive lesions of the cervix uteri and surrounding structures are to be found in a large percentage of women who have borne one or more children. While this is most likely to result from operative delivery, it may also occur following apparently simple or spontaneous labor. In this connection I have reviewed the records of forty multiparae who have had their entire obstetric experience under my care. These were all private patients and it has been possible to follow their condition for from one to five years subsequent to their last labor. Thirty-one of this group, at examination made several months or more after the last confinement, showed no evidence of prolapse or of serious injury to the supporting structures of the uterus. Nine, or 30 per cent, have presented laceration of the cervix and prolapse of the uterus to such a degree that operative correction was advised. This percentage of serious sequelae is sufficiently high to warrant a somewhat detailed study concerning the causal factors and possible preventive measures. To a certain extent it will involve a review of well-recognized conditions; in other words a "research into the obvious." Sometimes, however, facts are so very obvious that they lose their significance and require emphasis and reiteration in order to receive proper appreciation.

Lesions of the cervix are important because of:

1. The immediate danger of hemorrhage and subsequent puerperal sepsis.

2. Later subinvolution and retroversion.

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3. Hypertrophy and eversion of the cervix.

4. Injury to the supports of the uterus and bladder resulting in prolapse of these organs.

These injuries are due to a tearing of the cervix, involving the vault of the vagina, and the adjacent tissues supporting the uterus and bladder; which process has replaced normal physiologic dilatation of these structures. In a consideration of the anatomy involved we have to deal with two closely associated factors: 1. The cervical canal. 2. The supporting structures surrounding the cervix in the region of its vaginal attachment.

The structure of the cervix has been much discussed. We must regard the uterus as a definite organ specially adapted to three functions: 1. Through its endometrium and blood supply, it is prepared to furnish attachment for the fertilized ovum, and through its adaptable circulation to supply nutrition in proportion to the increasing needs of the developing product of conception. 2. The muscular elastic wall provides protection to the contents; and at the same time permits expansion of the cavity in response to internal pressure. 3. Finally as a result of some undetermined stimuli the uterine musculature proceeds to dilate its principal orifice, expel its contents, and control the open bleeding vessels preventing excessive loss of blood. The entire process normally proceeds in an orderly manner without injury, followed by perfect restoration of the organ to its previous condition.

Physiology teaches that plain muscle of the uterine type is capable of retaining its functions of passive retractility and active contractility even in the face of extreme extension, provided this latter process be a gradual one. This is well shown in the behavior of the uterus during and following full term labor when the muscle still retains its passive and active functions in spite of the extreme extension of the individual fibers during pregnancy. This property is lost only in cases where the distension of the uterus has been excessive or rapid; hydramnios or intrauterine hemorrhage. In a similar manner the musculature of the cervical portion is adapted to undergo extension of its individual fibers to a degree of what is called complete dilatation, permitting the passage of the full term fetus. It still retains physiologic tone, retractility and contractility, all with no injury to the individual fibers. Normal first stage labor provides an ideal mechanism for accomplishing this process. The intermittent, gradually increasing contractions, acting through the intact bag of waters, furnish a perfect hydrostatic dilator which secures a harmless dilatation of the circular muscle bands. The normal presenting part, the well flexed head, engaging in the pelvis serves a double purpose. It protects the bag of waters from undue pressure during uterine contraction, and maintains dilatation of the cervix in the interval between contractions. A second more active factor in the process of dilatation

is provided by the longitudinal muscle bands extending from the body of the uterus into the cervical portion where they are interwoven with the circular fibers. It is commonly stated that contraction of the longitudinal bands tends to actively draw the circular muscles upward over the presenting part thus contributing an important factor in the process.

From the above considerations it is evident that any approach to violent distension of the cervical musculature will result in more or less extensive laceration of muscle fibers. Such violence may be the result of excessive or continued uterine contractions especially from the use of oxytocics, as pituitrin; of premature rupture of the bag of waters and the substitution of the presenting part for the hydrostatic dilator; or of abnormal position of the presenting part. It goes without saying that any method of artificial or mechanical dilatation from the vagina introduces an element of violence and is certain to cause more or less injury.

The most important supporting structures of the uterus are in close proximity to the cervix. We recognize: 1. The fibrous triangular ligament attached to the pubic bones, supporting the bladder, surrounding and supporting the cervix, and continuous with the pelvic fascia attached to the sacrum about the rectum. 2. The pubocervical, and uterosacral ligaments and bands of musculofibrous tissues in this region and in the base of the broad ligaments. All of these structures are intimately associated with the cervix and with the vault of the vagina. They must always be considered as having been injured in lacerations involving either of the latter parts. During physiologic dilatation of the cervical canal and external os, the ligaments and fibromuscular supporting tissues are relaxed providing an opening in proportion to the dilated cervical orifice.

At the end of second stage labor these tissues are much distended and atonic, as is evident by the ease with which the cervix can be drawn to the outlet. Under favorable conditions these relaxed supporting structures are capable of undergoing spontaneous and complete return to normal during puerperal involution. Permanent damage may follow: 1. Tearing of the musculofibrous ligaments associated with laceration or violent divulsion of the cervix. Such lesions especially interfere with the support of the bladder resulting in cystocele and descent of the bladder attachment from the supravaginal portion of the cervix to the region of the external os. 2. On the other hand, continued subinvolution of the relaxed supporting structures is not uncommon, even in the absence of demonstrable laceration. This results finally in prolapse of the uterus but with no change in the relation of the bladder to the cervix. It simply represents a persistence of the mobility of the uterus which is present at

the end of second stage labor, increased by the continued pressure of a retroverted, subinvolted organ.

The first stage of labor, then, secures complete dilatation and retraction of the cervix with relaxation of the surrounding supporting structures in the vault of the vagina, and is complete only when the largest diameter of the presenting part has passed through this region. It should be fully appreciated that anatomically and physiologically, the tissues in question are adapted to a normal method of function which protects them from injury and allows involution to the previous condition. It is certain that deviations from this normal process carry danger of more or less serious damage. Therefore such substitutes for physiologic dilatation must be adopted only upon sufficient indication. A procedure must be selected which will most closely imitate the normal process, or one which presents the most favorable opportunity for immediate repair.

Let us consider some of the methods which interfere with normal first stage labor.

Voluntary effort or bearing down tends to advance the presenting part in the pelvic cavity, but automatically carries with it the partly dilated cervix and vaginal vault, resulting in laceration or undue tension on the supporting structures. Since it serves no immediately necessary purpose, it should be discouraged or controlled by sedatives until dilatation is complete. We should not expect marked advancement of the presenting part during the first stage of labor.

Oxytoxic medication (pituitrin) by increasing the intensity of uterine contractions may have the same effect and is objectionable during this period. In addition, pituitrin often causes a tetanic, spasmodic contraction of the uterus with injury to the fetus as well as serious laceration of a rigid cervix.

Operative delivery through an incompletely dilated cervix is attempted much oftener than is commonly acknowledged. One can easily satisfy himself on this point if he will make a visual inspection of the cervix in all cases of forceps delivery, and of version or breech extraction. Again, dilatation is not surely complete until the presenting part has actually passed through the cervical ring. What is apparently a soft dilatable cervix frequently presents unexpected resistance to active extraction, and it tears into the fornix of the vagina, often involving the base of the broad ligament and the supporting structures to a marked degree. Such forms of operative delivery should be delayed till spontaneous or artificial dilatation has been secured. Following this type of delivery, thorough visual inspection must be made and all injuries carefully repaired. Some object that this involves undue manipulation and danger of infection. This would also apply to the original procedure and if one is justifiable both are, since the second is but the necessary completion of the first.



Instrumental dilatation has at present but few advocates and is generally condemned.

Manual dilatation of the partially dilated cervix by the Harris method is popular and is exceedingly valuable under proper circumstances. It would be well, however, if each of us would frequently review the technic and limitations. Williams places three restrictions. The cervical canal must be obliterated and the external os partially dilated and dilatable, it must be executed with great care by an experienced operator, and placenta previa must be excluded. There are two dangers. Undue haste or violence leads to tearing instead of dilatation; and surgical delivery if attempted before manual dilatation has been completed results in traumatic laceration, often of considerable extent.

Vaginal packing, as described by Polak and others, frequently induces softening and dilatation of the cervix in a satisfactory manner. It is objected that the procedure presents danger of infection and, of course, time is required.

The insertion of an elastic bag filled with sterile fluid gives the nearest approach to the physiologic process since it secures dilatation from within, by means of intermittent hydrostatic pressure transmitted from uterine contractions. If the bag is undisturbed by traction and does not rupture, it is rarely expelled till the cervix has been retracted and dilated to the greatest diameter of the bag. One often finds, however, that some further degree of dilatation must be obtained: by additional contractions, repeated use of the bag, or other method. While the procedure requires time and manipulation, and is not always completely successful, it acts in a harmless and physiologic manner.

Elective surgical incision of the undilated or partially dilated cervix is a most efficient and satisfactory procedure in suitable cases. Two methods are described: 1. Lateral incisions of the partially dilated cervix are adequate in some cases, but are likely to involve more of the vault of the vagina and supporting structures than is appreciated, or to extend during delivery resulting in hemorrhage and lacerations which are difficult to control. In most instances it will be preferable to select the second method, that of formal anterior vaginal hysterotomy, or so-called vaginal cesarean section. In this, the injury to the cervical canal is deliberately planned and controlled. Also immediate and satisfactory repair is always possible.

I have reviewed thirty personal cases in which operative delivery was deliberately undertaken when dilatation of the cervix was less than one-half completed, in each instance for well recognized indication. Manual dilatation was selected in twenty-two, or more than two-thirds of the total. Of these women, all had been in labor for from ten to more than twenty-four hours, so the cervical canal was

already obliterated, the external os soft, and dilated to at least two fingers. In ten, or less than one-half of this group, there was no immediate evidence of cervical laceration, and subsequent examinations have revealed no trace of serious damage. In four cases, or about 16 per cent, evidence of severe cervical laceration at once appeared, and immediate repair was done with satisfactory late results. In eight, or approximately 33 per cent, while there was no sign of severe injury at the time of delivery, subsequent examinations demonstrated laceration and hypertrophy of the cervix with some prolapse. Five of these eight were primiparae or had previously had spontaneous labor, while the other three had previously undergone surgical delivery. While this group is too small to permit of positive conclusions, the study leaves in my mind certain impressions. In more than half of such cases serious damage will result, which however can usually be corrected at once. This is especially likely to occur if the cervix is rigid, or if undue haste or violence is used. It is not a safe procedure in case of placenta previa or low implantation because of the danger of tears. Great care is necessary to secure full dilatation before delivery is undertaken.

Vaginal packing was not done in this series, though in certain instances it might have been of value.

The elastic bag was used only twice. Once in a multiparae with placenta previa followed by version and extraction of a living child. There was evidence of cervical laceration caused by rapid delivery before resistance of the cervical ring was entirely overcome. The general result however was satisfactory. The second use of the bag was in an elderly primipara with premature rupture of the membranes several days before the onset of labor. After the cervical canal was obliterated and dilated to two fingers, a bag was inserted and retained for eight hours before it was spontaneously expelled. The cervix was then about two-thirds dilated and the process was completed manually, followed by version and extraction. An extensive lateral laceration was at once repaired, but subsequent examination showed cystocele and prolapse.

Anterior vaginal hysterotomy was done four times with entirely satisfactory results. Reconsideration of my experience with these cases leaves the impression of having had perfect control throughout, and of having secured accurate anatomic repair, of all injury done.

The danger of serious and permanent injury is still present even when cervical dilatation seems to be complete, but with the presenting part still retained above the cervical ring. In this connection I have reviewed two series of personal cases. In a group of twenty in which podalic version was performed through a cervical ring considered as practically dilated, there was no immediate evidence of serious injury to the cervix. Subsequent examinations have demon-

strated laceration and hypertrophy of the cervix with some degree of prolapse in one of five primiparae, and in four of fifteen multiparae. The second series concerns a group of forty primiparae in which midforeeps or Seanzoni operation was performed while the head was still within the cervical ring. In nine of these, laceration of the cervix was demonstrated and repaired at the time of labor. Later examination showed this result to be satisfactory in eight; one required secondary repair. Follow-up examinations have demonstrated laceration and hypertrophy of the cervix with more or less retroversion or prolapse of the uterus in nine of the remaining cases. In other words, nearly 50 per cent of this group showed immediate or late evidence of serious injury to the cervix or supporting structures of the uterus.

My impressions are quite definite. Podalic version and extraction can be performed with less danger of serious damage to the cervix and supporting structures than moderately difficult forceps delivery with the head still within the cervical canal. Serious injury may be expected in nearly one-half of such cases. Immediate repair gives satisfactory results and should be carried out at once.

#### CONCLUSIONS

1. Interference with physiologic processes in the first stage of labor causes serious injury in a considerable percentage of cases and should be undertaken only for sufficient indication.

2. One should carefully select the least harmful method and always look for injury to cervix and vaginal outlet.

LYCEUM BUILDING.

# SPINAL ANESTHESIA IN CESAREAN SECTION FOR TOXEMIA OF PREGNANCY\*

By B. G. M. ASTLEY, M.D., PHILADELPHIA, PA.

IT IS not my purpose to go into a discussion of all the general measures used in the kidney breakdown of pregnancy, or of eclampsia, but simply to report results.

The development of the toxemia of pregnancy places two lives in danger. Statistics of the treatment of this condition quote first the maternal results, and accord fetal statistics an absolutely minor consideration. On the other hand, where reasoning has suggested and experience later apparently demonstrated the value of newer methods of treatment, so far as fetal mortality is concerned, then these newer methods should be given some consideration in the plans for treatment of a given case.

The situation with the victims of toxemia is briefly that, during the progress of pregnancy, either solely because of pregnancy, or because of antecedent pathology plus pregnancy, a condition develops which jeopardizes the life of the mother, and carries with it therefore at least an equal hazard to the life of the child.

In considering the treatment of the mother the therapeutic situation may be epitomized as follows: If reduction of metabolic activity by rest and by limitation of diet, and the increase of elimination of waste products by proper measures, do not bring relief, the question of termination of pregnancy is brought up. If termination of pregnancy is decided upon, the details of each step necessary to delivery must be considered and evaluated; and if the patient is seen in the crisis of eclampsia, the same consideration is no less necessary.

Since the crisis is the result of substances elaborated during pregnancy, since the continuation of pregnancy will increase the amount of these toxic materials, and since the reserve of resistance to these toxic substances is an absolutely unknown quality, it is logical to relieve the mother of the strain of the continuation of pregnancy, if this can be done without adding factors of risk greater than those already being faced.

\* Possible maternal dangers in a rapid delivery are:

1. Shock from traumatism, if delivery be attempted by the natural route where the parts, either because of the period of pregnancy, the age of the patient, or local conditions, are unyielding.

2. Infection of unavoidably traumatized tissues in the presence of lowered general resistance.

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\*Read at a meeting of the Obstetrical Society of Philadelphia, February 4, 1926.

3. The hazards of the anesthetic in the presence of kidney and liver incompetency, and of cardiovascular strain incident to high blood pressure.

As far as the child is concerned we have practically the same situation.

1. The child shares with the mother in the toxemia and enters life with that certain, though unmeasurable, handicap.

2. Rapid delivery entails more physical risk than one of deliberation.

3. Prematurity will lessen the resistance both to the toxemia and the physical strain of delivery.

4. The anesthetic used in the delivery of the mother may be sufficient to turn the tide against the child, where resistance would have been sufficient otherwise, by making resuscitation difficult.

We believe then, with the situation considered as outlined, that spinal anesthesia is the method of choice, to be used in the interest of the mother, in certain cases of toxemia of pregnancy because:

1. It allows of the most rapid emptying of the uterus, that is by cesarean section, with the minimum shock to the patient, because its action is that of a nerve block with complete muscle relaxation of the abdominal wall, permitting most expeditious work.

2. At the same time it gives us the benefit to be derived from lumbar puncture in the lowering of cerebrospinal pressure, and from the lowering of blood pressure which its use entails.

3. It adds no element of hepatic toxemia or renal irritation, and, as stated, reduces blood pressure instead of elevating it as oxygen and nitrous oxide may.

In the interest of the fetus spinal anesthesia is especially valuable where, because of marked toxemia or because of prematurity, fetal resistance is at a low point, because:

It adds nothing to the blood which may interfere with resuscitation, or with the functioning of any other already impaired vital processes. Its use is therefore particularly indicated where even more than average importance is attached to the life of the child, as in elderly primiparae who have had renal impairment antedating pregnancy, and where conception therefore may not be allowed to occur again.

I am herewith reporting a short synopsis of the cases of spinal anesthesia of Dr. Jesse O. Arnold and my own which have served as the basis from which the foregoing conclusions have been drawn.

#### *Cases of Dr. Jesse O. Arnold.—*

CASE 1.—Para i, age twenty, in seventh month of pregnancy. Toxemia and acute hemorrhagic nephritis. She had four convulsions before operation, cesarean, and two convulsions on table. She had one convulsion one and one-half hours later in which she died. Baby, which weighed less than four pounds, survived, and is healthy child now four years of age.

CASE 2.—Para i, age thirty-one, at term. Preeclamptic toxemia. No convulsions. Cesarean. Good recovery, both mother and child.

CASE 3.—Para i, age twenty-eight, at term. Toxemia, eclampsia. Four convulsions before operation. Cesarean. Three convulsions postpartum. Good recovery of mother and child.

CASE 4.—Para i, age thirty-four, in sixth month of pregnancy. Acute hemorrhagic nephritis, eclampsia. Four convulsions before operation. Cesarean. Two convulsions postoperative. The mother had good recovery, child died in three days. Prematurity.

CASE 5.—Para i, age twenty-three, at or near term. Toxemia, eclampsia. Three convulsions. Cesarean. Recovery of mother and child.

CASE 6.—Para i, age twenty-one, at term. Toxemia. Several convulsions before operation. Cesarean. Two convulsions after operation. Good recovery of mother and child.

CASE 7.—Para i, age nineteen, at term. Eclampsia, lobar pneumonia. Six convulsions before, eight after operation. Cesarean. Death from pneumonia on eighth day. Child recovered.

*Cases of Dr. G. M. Astley.—*

CASE 1.—Para i, age thirty-two, uterine deformity, seven and one-half months pregnant. Systolic pressure, 158. Trace albumin. Section determined by reason of deformity of uterus, malposition child, and risk of continuation of pregnancy because of tenseness of uterus. Child, 4 pounds, 9 ounces, survived.

CASE 2.—Para i, age twenty-eight, distinct bicornate uterus. Seven months pregnant. Fetus transverse; uterus tense, fetal parts not palpable and rupture appeared imminent. Cesarean. Child 3 pounds, 2 ounces, survived.

CASE 3.—Para i, age thirty-one, obese. First seen at four and one-half months, pressure then 180/90; at eight and one-half months; pressure 174/118. Edema, general headache, albumin, granular casts. No sign onset labor. Cesarean. Child 8 pounds, 8 ounces, survived.

CASE 4.—Same patient as case 3 two years later, at term. Repetition renal difficulties. Cesarean. Child and mother recovered.

CASE 5.—Para i, age twenty-seven, seven and one-half months. Eclampsia. Three convulsions before operation, two after. Cesarean. Both recovered, child 3 pounds, and 10 ounces.

CASE 6.—Para i, age thirty-three, six and three-fourths months. At this time developed insufficiency of a known, deformed, single kidney. Pressure increased from 160 to 210 systolic in twenty-four hours despite rest, diet reduction and elimination. Cesarean. Child 3 pounds, 7 ounces. No difficulty in resuscitation of child, but died suddenly two days later while nursing. Mother, good recovery.

To summarize then we have twelve patients, all primiparae, one twice operated upon, giving thirteen operations. Six patients are over thirty years of age. Seven patients have had convulsions, both before and after operation. Four others have had preeclamptic toxemia of high degree, and one of moderate degree. One patient without toxemia, but included to show value of spinal anesthesia in prematurity.

In this group two mothers died, one, with acute hemorrhagic nephritis as a climax to a stormy gestation from toxemia; the other of pneumonia, eight days postoperative, the eclampsia and pneumonia both present at the time of operation.

In this group among the children surviving, one weighed 3 pounds, 2 ounces; one 3 pounds, 6 ounces; one 3 pounds, 10 ounces; one 4

pounds, 9 ounces; one 5 pounds, 8 ounces. Two children died, one at six months, surviving three days, and one at six and three-fourths months, surviving two days.

The method of spinal anesthesia used was that employed at the Samaritan Hospital, Philadelphia, in the surgical clinic of Dr. W. W. Babcock.

5317 MASTER STREET.

(For discussion, see page 117.)

## CANCER OF THE CERVIX COMPLICATING PREGNANCY, SHOWING THE HARMFUL EFFECTS OF RADIUM ON THE FETUS\*

BY JOSEPH J. MUNDELL, M.D., WASHINGTON, D. C.

SINCE radium has come to be recognized as the choice of treatment in the vast majority of cases of cancer of the cervix, it is the purpose of this paper to call attention to the damage to the fetus that may result from the application of radium during pregnancy.

On December 3, 1920, the patient, a well-developed, well-nourished woman, aged twenty-five, was seen for the first time, complaining for the preceding two weeks, of malaise, vomiting and diarrhea. In June, 1919, eighteen months previously, she had been delivered by cesarean section after being in labor for two days. It was stated by her attendants that the cervix was rigid and did not dilate. She stated that her last normal period was three weeks preceding her visit to me but that since then she had bled for five days. Upon vaginal examination the cervix was found to be greatly enlarged, especially the anterior lip which was the site of a cauliflower growth. The uterus seemed to be only slightly enlarged and motility was limited. The examination caused excessive flooding, only controlled by tight vaginal packing. Thereafter bleeding continued more or less constantly until her removal to the hospital December 10, when a biopsy was performed and sections showed carcinoma. Section of the blood clots did not show chorionic villi. Considering the case to be inoperable, radium treatments were instituted. A total of twenty-one hundred and fifty milligram hours were administered in three treatments, on alternate days beginning December 17. Thereafter the patient's condition became much worse and two months later, on February 21, 23 and 25, 1921, a total of twenty-one hundred milligram hours was again applied. For two days following there was more or less constant cramp-like pain and on February 27 she aborted a three months' fetus. I was unaware that she was pregnant, thinking the increase in the size of the uterus was due to the advancing growth of the cancer.

The patient died September, 1921, nine months after the onset of symptoms. The disease seemed to progress more rapidly and to be more virulent than in any case I have seen, which bears out the observation that has been made often that cancer in young persons is of a particularly malignant type.

Cancer of the cervix associated with pregnancy is an extremely rare complication. The very nature of things seems to contraindicate such an occurrence. One usually thinks of cancer at the menopause and of pregnancy occurring in early adult life. Cancer, however, is not a rarity in the childbearing age. Also one might assume that condi-

\*Read at a meeting of the Medical Society of the District of Columbia, May 12, 1926.

tions existing in cancer of the cervix, the hypertrophy, engorgement and bleeding would be a natural barrier to conception, but strange to say in most of the cases which I have collected, in the judgment of the reporters, cancer preceded the pregnancy. Such was undoubtedly true in my case. The relative frequency of this complication is a little difficult to determine. Sawey<sup>1</sup> published a series of cases in 1899 and gives its occurrence as once in every two thousand. B. C. Hirst,<sup>2</sup> in 1923, endeavoring to learn the frequency, sent a questionnaire to a number of obstetricians in this country and in a total of 299,621 pregnancies there were twenty-four cases of cancer of the cervix encountered or one in every 12,484. The high and low ratios were as follows: Asa B. Davis reported 137,966 pregnancies with five cases of cancer, or one in 27,599, while Mussey of the Mayo Clinic reported 3,500 cases in thirteen years with eight cases of cancer or one in 437.

Gross<sup>3</sup>, in 1922, published one of the most valuable papers upon this subject, reporting thirty-four cases of cancer of the cervix observed within twelve months following either confinement or abortion. He stresses the point that a close follow-up should be kept for at least one year after confinement or abortion in women who are thirty years of age or over. Other writers since have dwelt upon the importance of this practice and no doubt a wide acceptance of it will result in an earlier detection of a number of cases of cancer of the cervix. Certainly it is to be commended.

While in the histories reviewed cancer preceded the pregnancy in most instances, yet there were cases in which it seemed that the cancer developed during pregnancy. A discussion of this phase would seem to have merely an academic value, without any practical significance.

Many heated discussions have been waged as to what effect pregnancy has upon cancer. If a debate should be arranged having for its subject, "Resolved that pregnancy has a deleterious action upon cancer of the cervix," quite a formidable array of articles could be collected upholding the affirmative side and also just as many, possibly more of the late papers, could be found espousing the negative. For the affirmative it is argued that the increase in the blood and lymphatic supply concomitant with pregnancy tends to favor the growth of cancer. Writers who support this view are Bumm,<sup>4</sup> Hoffmeier,<sup>4</sup> Koblanck,<sup>4</sup> Opitz,<sup>4</sup> Sawey,<sup>4</sup> Sellheim<sup>4</sup> and Zweifel.<sup>4</sup> For the negative it is claimed that the great increase in the connective tissue, the predominating tissue in the enlarged pregnant uterus, acts as a barrier to the aggressive cancer cells. As a matter of fact it is the connective tissue overgrowth which is a pronounced factor in controlling cancer by radium. There are some who maintain that there is present a hormone of pregnancy which tends to retard any neoplastic growth. Among the supporters of one or the other latter views



are: Sommers,<sup>4</sup> Weibel,<sup>4</sup> Wolf,<sup>5</sup> Mayer,<sup>6</sup> Fellner,<sup>7</sup> Senator,<sup>7</sup> Kaminer,<sup>7</sup> Kok,<sup>8</sup> Dieulofe.<sup>9</sup> The articles supporting the negative side are more recent than those for the affirmative and it would seem that the trend of opinion of recent observers is that pregnancy has a tendency to retard the growth of cancer. It is quite generally accepted, however, that after the termination of pregnancy cancer grows rapidly.

Even though the simultaneous occurrence of these two conditions is a rarity it will be well to bear them in mind if one sees bleeding in pregnancy in the late thirties or when dealing with known cancer of the cervix during the childbearing age.

The interesting feature in this subject concerns the treatment, especially since the advent of radium.

Uncomplicated by pregnancy the accepted treatment of the rare early case of cancer of the cervix is panhysterectomy. For all other cases, borderline or advanced, radium is advocated, if not as a curative at least as a palliative measure. We shall see what influence the existence of pregnancy has upon deciding the course of treatment.

Suppose one encounters an early operable case of cancer of the cervix complicating pregnancy at the third month. The only hope of cure is immediate hysterectomy. To delay the operation until the fetus reaches viability means that the mother's chance of recovery is jeopardized, if not forfeited, because only a few months' delay may mean widespread dissemination of the growth. As a matter of fact, however, early operable cases of cancer of the cervix with or without concomitant pregnancy are clinical rarities, seldom if ever seen. Whenever met, the indications are clearly cut for wide total extirpation.

Not so easy is the decision as to the method of treatment in cancer advanced beyond the operable stage, if pregnancy is coexistent.

In the borderline cases of cancer uncomplicated by pregnancy, that is, cases in which the disease is not widespread and the patient's general health is not materially impaired, there is some dispute as to the most efficacious method of treatment. A few still cling to operation combined with radium but the majority of gynecologists are becoming more and more of the opinion that with radium alone the best results are obtained. This trend of opinion is perplexing in the solution of the problem because it is attempted in this report to show that radium, when applied during pregnancy, has decidedly harmful effects upon the fetus. For some few years past we have been receiving reports from animal experimenters of the baneful effects to the offspring from radium and x-ray applied during pregnancy in mammals.

Von Hippel, Jr.,<sup>10</sup> with rabbits in the second week of gestation produced death of the fetus.

Schinz<sup>11</sup> interrupted pregnancy in the rabbit and cat.

Burchhard and Sebileau<sup>12</sup> lengthened the period of gestation by delayed embryonal development.

Schmid and Lewey<sup>13</sup> produced far-reaching damage to the brain, spinal cord and retina in lower vertebrates.

DeNobele and Lams<sup>14</sup> with twenty-two rats and twenty-nine guinea pigs produced undoubted evolution of pregnancy; in the majority of cases the fetus was killed; in others monsters resulted and irradiation seemed to favor production of ovarian cysts.

Since 1923 reports have also appeared of injurious effects on the human fetus from radium and x-rays. Enough cases have now been reported to convince us that pregnant women must not be subjected to applications of radium if there be any chance of their going to term. The same dictum applies to intensive x-ray treatment. Leading x-ray men, however, feel that there is no danger to the fetus from x-rays applied during pregnancy simply for diagnostic purposes.

The following case reports have been collected in which radium has been used during pregnancy without deleterious effect upon the child.

Bailey and Bagg<sup>15</sup>; one case of cancer of the cervix with normal baby at term, treated at the fifth month; and one case of epithelioma of vulva treated at six and a half months, baby at term four and a half pounds but otherwise normal.

Vital Aza,<sup>16</sup> radium treatment extending over three months, normal baby at term.

Cathals and Merat,<sup>17</sup> radium treatment third month, premature but otherwise normal baby.

Roche,<sup>18</sup> radium treatment fifth month, normal baby at term.

Hartman and Fabre,<sup>18</sup> radium treatment fourth month, normal child, five pounds, cesarean at eighth month.

Metzger and Legneu,<sup>19</sup> radium treatment third month, normal baby at term, forceps.

Schilling,<sup>20</sup> radium treatment seventh month, normal baby at term, cesarean.

Schweitzer,<sup>21</sup> normal baby at term.

Field,<sup>22</sup> radium treatment seventh month, normal baby, four pounds, spontaneous delivery at eighth month.

Werner,<sup>23</sup> small, but normal child.

Lawson,<sup>24</sup> fibroid and pregnancy, x-ray fourth and fifth month, normal child, cesarean at term.

Kanc,<sup>25</sup> radium applied at second month of pregnancy for cervical polyp. Pregnancy not suspected. Cesarean section tenth month after protracted labor four days, due to rigid cervix. Fetus was dead at time of operation having succumbed during long labor. Fetus seemed to be about eight months.

Titus,<sup>26</sup> inoperable cancer of cervix complicating pregnancy at fifth month, treated with radium, 2400 milligram hours, spontaneous labor at term, normal living baby, seven pounds, ten ounces.

The following series present quite a different aspect, showing the harmful effects of radium on the fetus.

Bailey and Bagg,<sup>15</sup> glioma of cord in mother treated with x-ray and radium third month, cesarean at term, baby had spina bifida and double club-feet, died in fifteen days.

Siredy,<sup>16</sup> radium treatment fifth month, immediate abortion.

De Rouville,<sup>16</sup> radium treatment fifth month, abortion sixth month.

Ashenheim,<sup>27</sup> x-ray third to sixth months for fibroid, microcephalic imbecile, with optic atrophy.

Brindeau,<sup>28</sup> malformed baby following irradiation for fibroid.

Flatau,<sup>29</sup> microcephalic weak child, x-ray.

Seitz,<sup>29</sup> imbecility.

Naujoks,<sup>29</sup> injury central nervous system, eye damage, underdeveloped.

Apert and Kermogant,<sup>30</sup> mongolianism.

Schwaab,<sup>30</sup> microcephalic and dystrophic child.

Foveau de Courmelles,<sup>14</sup> change in fetus.

Abels,<sup>31</sup> microcephalic child, abnormality of eyes, x-ray for fibroid.

Stettner,<sup>32</sup> fibroid and pregnancy, treated with x-ray second month, underdeveloped, hypospadias, strabismus, deficient mentality.

Emil Ries,<sup>33</sup> x-ray treatments third month, diagnosis not stated, delivery at term, stillbirth, hydrocephalus and many other abnormalities.

Mundell, radium third month for cancer of the cervix, immediate abortion as above stated.

In a few of the case reports above quoted in which the babies are reported as normal, it is noted that the weights are five pounds or less. Even though no gross abnormalities can be detected certainly a five-pound baby is handicapped.

Fourteen out of twenty-nine cases resulting in abortion or malformed babies should be sufficient warning of the dangers from radium or x-ray applied during pregnancy. It would seem that the greatest damage resulted in those cases in which radium or x-rays were applied in the early months of pregnancy. It might be argued that in some of the case reports above quoted the deformities in the babies were not directly attributable to the effects of radium or x-ray but were rather due to the impoverished condition of the mother. Be that as it may, in each instance the reporter gave it as his opinion that the deformity was the result of radiotherapy. Also such malformations have not been noted heretofore in children born of mothers suffering with cancer of the cervix before the advent of radium treatment. Therefore it would seem to be safe to say that such conditions are not merely coincidences.

In many of the articles reviewed it seemed to be the sense of the writers that therapeutic abortion in the face of cancer entailed too much danger from trauma and hemorrhage to be considered at any time. Because of the same dangers, delivery at or near term was best accomplished by cesarean section in most instances.

Having a case of pregnancy before viability, complicated by inoperable cancer of the cervix, what treatment should be outlined? If there does not seem to be great infiltration beyond the cervix it might be well to extend the limit of operability and do a hysterectomy. However, in an acknowledged inoperable case hysterectomy is futile and as has been seen by this review there is too grave a risk to the welfare of the fetus to permit the use of radium. It would seem then that the only feasible procedure to adopt is to revert back to cauterization of the cervix, the mode of treatment in vogue before the

advent of radium. Especially should this method be adopted if radium is used with the idea that it is a palliative measure.

The practical lessons to be drawn from this study are two. The first is for the obstetrician, who should have cancer in mind when he finds bleeding during pregnancy in an elderly woman, and to be on the lookout for it for at least a year following confinement or abortion in women in the late thirties. The second lesson is for the radiologist, who should rule out pregnancy by searching history-taking and careful examination before treating either carcinoma or uterine fibroid during the childbearing age, because radium or x-ray applied during pregnancy entails much damage to the fetus.

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# THE TREATMENT OF HYPEREMESIS GRAVIDARUM, WITH PARTICULAR REFERENCE TO THE USE OF GLUCOSE AND INSULIN: REPORT OF 18 CASES

BY EDWARD G. WATERS, PH.B., M.D., JERSEY CITY, N. J.

IN DISCUSSING treatment, it is pertinent that the condition treated be clearly defined if any conclusions are to be made from the clinical changes observed. We use the term hyperemesis gravidarum to include all those cases of vomiting occurring during pregnancy in which the vomiting is sufficiently severe and persistent to injure the patient's health. The train of symptoms—headache, insomnia, mental agitation, epigastric pain, constipation, thirst, dehydration, urinary and blood changes, etc.—are all due to or dependent upon the emesis. If we can control the vomiting, we can, of course, cure the patient. Irrespective of the initial etiologic agent, we assume that the patient vomits in spite of herself. Whether the vomiting was effected by neurotic tendencies or not, the case of *true* hyperemesis is one of uncontrollable and pernicious vomiting sustained by a vicious vomiting-starvation-acidosis cycle.

With the above postulates in mind, our treatment of hyperemesis has been directed against the immediate cause of the vomiting, i.e., the toxemia, as manifested by the blood and urinary findings. The blood findings are diminution in the alkali reserve and lowering of the  $\text{CO}_2$ -combining power, and rarely, lowered blood sugar. The urinary changes, other than those due to dehydration, are an increased ammonia coefficient, decreased urea output, and the presence of the ketone bodies.

We combat the toxemia indirectly by eliminating the circulating toxins and directly by oxidizing or neutralizing them. Elimination through the bowel is encouraged by the use of high colonic irrigations, following a cleansing enema. These are given once or twice daily. Renal excretion is of greater importance but less easily obtained. It presupposes a sufficient fluid intake which by virtue of the vomiting does not exist. Therefore, parenteral introduction of fluids must be resorted to. We employ rectal instillations of 10 per cent glucose and 5 per cent sodium bicarbonate in 120-200 c.c. amounts every four hours. If the bowel is intolerant, 1 c.c. camphorated tincture of opium is added to the instillation or the glucose is reduced to 5 per cent. If marked dehydration is present, hypodermoclysis of 1000 c.c. of physiologic saline solution is given. An intravenous injection of 10 per cent glucose and 5 per cent sodium bicarbonate is preferable,

however, given in amounts of 700-1000 c.c. Promotion of elimination through the skin is seldom stressed and the hot pack is rarely used.

The toxemia is treated directly by the use of alkalies, as outlined above, to raise the  $\text{CO}_2$ -combining power of the blood, and by the use of glucose and insulin intravenously to destroy the ketones. We have found the latter method, introduced by Thalhimer<sup>1</sup> in recent papers and employed by others,<sup>2</sup> to be of distinct benefit and attended by cessation of vomiting.

The amount of glucose-insulin and the frequency of its use obviously depend upon the conditions present. The vomiting-starvation-acidosis cycle of Thalhimer is broken up by overcoming the acidosis. Glucose is introduced and metabolized in large amounts, and by its metabolism carries to their final stage the ketone bodies which have been evolved by the starvation and which maintain the vomiting. It has been our experience that the patient stops vomiting *when the ketonuria disappears*. We therefore maintain the eliminative and combative measures until the ketones no longer appear in the urine.

We employ a chemically pure, freshly made, distilled water solution of 10 per cent glucose, and use 50-100 gm. at each injection, giving approximately 3-5 gm. of glucose for each unit of insulin. Thus, with 900-1000 c.c. of 10 per cent glucose (90-100 gm.) we give 20 units of insulin. This is repeated every twenty-four hours until there is definite clinical and laboratory evidence of improvement, the vomiting and the ketonuria being the indices. With a marked lessening of the ketonuria and increase in blood  $\text{CO}_2$ -tension, accompanied by cessation of vomiting following one injection, it is safe to withhold a second, pending change in condition. However, if more than one injection is required to control the vomiting, injections should be continued daily or oftener until there is complete absence of ketonuria. The importance of this is well emphasized in Case 8. The total fluid intake and output should be carefully recorded and the intake kept at or above 3500 c.c. in twenty-four hours.

With regard to purely symptomatic treatment, there is little to add. We use corpus luteum empirically and believe it to be of value in mild cases, used daily in 0.5 c.c. doses, intravenously. Adrenalin, 5-10 minims subcutaneously or 40 minims rectally, is of value when the blood pressure is low. Rectal instillations of chloral hydrate, gr. 20, and triple bromides, gr. 40 to 60, are often used to give much needed rest. Morphine may be substituted in  $\frac{1}{4}$  gr. doses. Gastric lavage or drainage with a Rehfuess tube is sometimes of benefit. The multitudinous "specifics" for vomiting are not given, for we have never seen them give better than very transient or questionable relief. The use of salt solution by various routes has failed to relieve a number of patients who responded immediately to glucose-insulin intravenously.

## CASE REPORTS

The following case report illustrates the effect of glucose-insulin intravenously after failure of another régime:

CASE 1.—E. B., aged twenty-four, para i, was admitted because of persistent vomiting of five weeks' duration. Marked weakness, prostration, and dehydration, severe headache, and epigastric tenderness were all present on admission. Urinalysis showed acetone 4-plus, and diacetic acid 4-plus. For two days the patient was given 2 c.c. of corpus luteum intravenously, daily; high colonic irrigations daily; fluids by Murphy drip continuously. On the third day the patient was weaker than on admission and the ketonuria was still as intense. She was then given 900 c.c. of 10 per cent glucose and 30 units of insulin intravenously. There was no emesis following this, and in twenty-four hours the ketonuria had practically disappeared. The patient was discharged at her own request seven days after admission. Her subsequent course was normal.

The next report is typical of those patients who were given glucose-insulin intravenously without recourse first to other measures:

CASE 5.—M. P., aged twenty-three, para i, six weeks' pregnant, was admitted to the hospital after having been in bed for eleven days because of vertigo, prostration, precordial pain, nausea, and frequent vomiting. For four days she had vomited everything taken by mouth. Examination showed marked prostration and dehydration, heavily coated tongue, and enlarged heart with an apical systolic bruit. The blood pressure was normal. Urinalysis showed a faint trace of albumin, acetone 4-plus, and diacetic acid 2-plus. She was given 1000 c.c. of 10 per cent glucose and 15 units of insulin intravenously. The vomiting stopped after the injection and did not recur. The ketonuria disappeared in twenty-four hours and the patient was discharged after nine hospital days, fully recovered and apparently in good health.

The following case report illustrates the most severe type met with, and shows the importance of persistence until the ketonuria is overcome. It is this group in which therapeutic abortion often seems imperative, but which we believe to be rarely indicated and often the terminal insult.

CASE 8.—A. P., aged twenty-nine, para ii, six weeks' pregnant, was admitted to the hospital because of persistent vomiting of all food for two weeks. She had been in bed for the first three months of her first pregnancy and had vomited until its termination. When admitted, December 21, 1924, marked prostration and dehydration were evident. Blood sugar was 94; acetone and diacetic acid were present in the urine. She was given daily colonic irrigations, corpus luteum injections, chloral and bromides by rectum, and high carbohydrate diet. Vomiting persisted for three days, when she was given 500 c.c. of 10 per cent glucose and 20 units of insulin intravenously. There was no vomiting for three days, then at intervals until January 4, when 1000 c.c. of 10 per cent glucose and 20 units of insulin were given intravenously. There was no improvement, and a beginning jaundice was noted. January 6 the injection was repeated, with 30 units of insulin. The following day there was general abdominal pain and tenderness, especially in the hepatic area. Gastric lavage and the duodenal tube were resorted to. The urine continued to show acetone and diacetic acid in large amounts. The next day the patient became very restless and irrational, vomiting frequently, and complaining of severe epigastric

pain. Slight jaundice was present over the entire body. One thousand c.c. of 10 per cent glucose and 30 units of insulin were given without apparent effect. Rectal instillations of 250 c.c. of 10 per cent glucose, and 5 per cent sodium bicarbonate, every four hours, were given and continued until January 15. On January 10 the patient's condition was very poor. There was intense general jaundice, marked liver tenderness with diminution in size, intense vomiting, and ketonuria. One thousand c.c. of 10 per cent glucose with 15 units of insulin were given. On January 12 the injection was repeated by hypodermoclysis, as most of the veins had been used in withdrawing blood or in previous injections. On January 13 there was no change in her condition. Three thousand c.c. of glucose solution and 30 units of insulin were given by slow hypodermoclysis, taking three and one-half hours. After absorption of this amount, 1750 c.c. of glucose and 17.5 units of insulin were given by hypodermoclysis. The following day the jaundice was distinctly less, diacetic acid was absent from the urine for the first time since admission, and the acetoneuria was 2-plus. The patient was vomiting mucus and froth frequently. Two thousand c.c. of 10 per cent glucose and 30 units of insulin were given by hypodermoclysis over a period of four hours. On January 15, the patient stopped vomiting for the first time since December 27. She was extremely weak, still jaundiced, and the breasts were very sore. The urine was clear of ketone bodies and there was glycosuria of 1.2 per cent (25.2 gm.). From this date on, recovery was rapid. Coincident with the disappearance of the ketosis, the albuminuria lessened, casts and red cells disappeared, and the jaundice lightened daily, and was gone in five days. On January 22 the patient was strong enough to be up, and on January 30 she was discharged as cured. The subsequent course of her pregnancy was normal.

#### COMMENT

Of the 18 patients represented by this series, 13 were treated with high carbohydrate diet, saline hypodermoclyses, sufficient fluid intake, corpus luteum intravenously, and symptomatic treatment of various kinds before intravenous injections of glucose and insulin were used with curative effect. There was one recurrence (Case 7) which promptly responded to treatment. The entire series of 18 would be classified under the "serious or pernicious" grouping of Titus,<sup>3</sup> for exhaustion, emaciation, dehydration, beginning nephritis or early jaundice were singly or severally present, and acidosis was present in every case listed. One injection caused cessation of vomiting in 14 patients within twenty-four hours and the average hospital duration of these was thirteen days.

The clear-cut results which have attended our procedure, as contrasted in our experience with others, using only glucose solutions<sup>2, 3</sup> or fluids freely,<sup>6</sup> seem to emphasize the advisability of using insulin and glucose intravenously in the treatment of hyperemesis gravidarum.

#### SUMMARY OF CASES

Total number of cases	18
One injection sufficient	15
Cessation of vomiting within 24 hours	14
Hospital duration of the above class	12 days



Hospital duration of others 24 days  
 Duration of symptoms before treatment 10 days to 6 weeks  
 Blood sugar lowered in 3 cases: 78 (2), 86.2 (12), 82.4 (14)  
 mg. per 100 c.c. blood.

I am indebted to Dr. S. A. Cosgrove for his interest and guidance in caring for the majority of these patients on the Obstetrical Service at the Jersey City Hospital.

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644 WEST SIDE AVENUE.

### AN EXCELLENT SUBSTITUTE FOR BREAST MILK

By D. A. CALHOUN, M.D., Troy, N. Y.

UPON the obstetrician of today rests the responsibility of providing the means whereby the baby obtains the proper start in life and continues to remain in health while under his care. In undertaking this responsibility he is beset with many difficulties, and paramount among these is the all-important question of weight. The infant who is sufficiently nourished will be contented, healthy, and gain weight; but given an infant which is not gaining, consequently not contented, a multitude of difficulties make their appearance. The question of infant mortality is directly concerned with gain in weight. Infants gaining properly are healthy. Maternal nursing, of course, is the aim of our endeavor, but when there is an absence, or an insufficient amount of breast milk, the infant can be made to gain by artificial means.

Artificial feeding, therefore, becomes necessary under the following conditions:

Babies both full term and premature when the breast milk is absent.

Complementary feedings when the mother's milk is inadequate, either in quantity or quality.

Artificial feeding when the baby is weaned.

The first needs no comment. A maternal supply, foreign to the baby, is at best difficult to obtain and artificial milk becomes necessary.

Secondly, supplemental feeding is becoming more and more prevalent. The food which will halt a faltering weight curve and guar-

antee a prompt and efficient return of the baby's weight to normal is the one of choice, whether it be only a temporary or a permanent feeding. How often one sees the infant under the quiet régime of the hospital thrive and surpass its birth weight, only to falter and lose ground after reaching home. Symptoms of insufficient nourishment make their appearance in spite of all attempts to regulate the mother's diet or the use of galactagogues. It then becomes necessary to supplement the deficiency with artificial food.

Lastly, babies weaned during the first year require artificial food.

Under these various conditions, what artificial food shall be used? It must be one to which the baby will immediately adapt itself without difficulties or ill effect, and at the same time one on which there is immediate gain of weight without vomiting, restlessness, or intestinal upset. In fact, the formula chosen must be one which will replace the normal breast milk with all of its advantages, as near as is humanly possible.

After experience with many infants, under the three previously mentioned conditions, I have found the lactic acid milk of Mariott and Davison to fulfill all of the above conditions, and now use it to the exclusion of all other formulae, with very successful results. I have not yet seen it fail in a single instance, and the old adage of four ounces gain a week seems to be passing into oblivion. Infants on this form of nourishment surpass that figure regularly, and it is not at all uncommon to see them gain as much as a pound a week. This weight is equally distributed to all the elements of the body, thereby promoting proper growth and good health. After a few days on this formula, the weight begins to increase and continues steadily; the baby is soon content and only awakens at feeding time. The babies are all placed on a three-hour schedule and the last feeding is given at ten o'clock after which sleep is enjoyed until the following morning. The so-called colic, so troublesome with many babies on other forms of nourishment, is almost unknown. The digestion is thorough and complete as is shown by the perfectly normal stools and the absence of either constipation or diarrhea.

Without going into detail, the theory upon which this type of milk is based is briefly as follows: All milk contains a certain so-called buffer substance, that is, a substance capable of uniting with considerable amounts of acid, or alkali, without undergoing any great change in its chemical reaction. Breast milk contains a very small amount of this substance; it therefore neutralizes the normal hydrochloric acidity of the stomach to a minimal degree, thereby making breast milk readily, quickly, and completely digested in quantities adequate for the needs of the growing infant. Cow's milk, on the other hand, contains large amounts of the substance and consequently neutralizes considerable amounts of the hydrochloric acidity in the

stomach, thereby decreasing the digestibility and making it difficult or sometimes impossible to feed the infant sufficient quantities to maintain a proper nutritive balance. Cow's milk should, therefore, in some way be acidified in order to compensate for the acid neutralization referred to above.

Carbohydrate deficiency should be supplied by the addition of proper quantities of some form of sugar easily digestible and assimilable. Corn syrup not only contributes the lacking caloric and nutritional value, but also furnishes the needed carbohydrate in the form of dextrose, the fully converted form into which every sugar or carbohydrate substance must be changed before absorption and assimilation occurs. This promptly absorbable and assimilable form of sugar produces no irritation of the gastrointestinal mucosa and throws no strain on the digestive function.

Lactic acid milk is easily prepared as follows:

1. Use only a good grade of cow's milk, which need not necessarily be pasteurized.
2. To each pint of milk add two tablespoonsfuls of Karo Corn Syrup and mix thoroughly.
3. Boil the milk for five minutes. If the mixture is brought to a boil and allowed to simmer rather than boil vigorously the evaporation is less and the results just as good.
4. Allow the milk to stand in a cool place until thoroughly chilled; overnight in the ice box is preferable.
5. With a medicine dropper, add drop by drop with gentle stirring, one teaspoonful of lactic acid, C. P., 85 per cent, to each pint.
6. Store in a cool place until used.

TABLE I

BIRTH			6 MONTHS		
7	Lb.	3 Oz.	18	Lb.	0 Oz.
6	"	4 "	14	"	0 "
8	"	2 "	14	"	3 "
6	"	10 "	18	"	0 "
8	"	8 "	19	"	0 "
3	"	3 "	12	"	3 "
8	"	3 "	18	"	2 "
7	"	6 "	21	"	0 "
8	"	4 "	17	"	0 "
9	"	4 "	21	"	0 "
6	"	8 "	17	"	0 "
8	"	0 "	23	"	0 "
7	"	5 "	15	"	2 "
7	"	0 "	23	"	0 "
7	"	5 "	18	"	0 "
9	"	0 "	21	"	0 "
7	"	8 "	23	"	0 "
7	"	2 "	17	"	0 "
3	"	5 "	15	"	0 "
8	"	6 "	18	"	0 "
7	"	3 "	17	"	2 "

In order better to appreciate the value and advantages of this food, I have tabulated the weights of some of the infants fed exclusively on this milk (Table I). The weights at birth varied from three pounds in premature infants to nine pounds in full-term babies; the average weight is seven pounds and three ounces. At the end of six months, several of the babies weighed as much as twenty-three pounds. The average weight at the end of this time is seventeen pounds and two ounces. This is better than double the birth weight by three pounds.

It is pertinent to mention that the state of health of these babies was perfect throughout the entire period of six months; not in a single instance had there been a single day of illness of any character.

The advantages of this form of infant feeding are that it permits feeding whole milk in practically the same quantities as the normal breast-fed infant obtains, with an almost completely converted sugar content, which is in a condition for ready absorption, without appreciable digestive effort or irritative effect on the intestinal mucosa. It furnishes the mother with a very easily prepared food of normally unchanged formula, which is simply increased in quantity as the infant grows older. Due to the inhibiting effect of the acid on the bacterial growth, the food is substantially free from pathogenic bacteria, and keeps perfectly when ordinary precautions are used. The acidification of the milk promotes coagulation of the curd, thus rendering the protein element more readily digestible and absorbable.

108 SECOND STREET.

# THE RESULTS OBTAINED IN TREATED AND UNTREATED CASES OF SYPHILIS IN PREGNANT NEGRO WOMEN

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THREE hundred and fifty women having four-plus Wassermanns were studied. Two hundred and twelve of these had no antisyphilitic treatment. The remaining 138 had treatment that was, on the whole, inadequate and started late in pregnancy.

It is hard to get the class of people with whom we have to work to take antisyphilitic treatment during pregnancy. It is just as hard to get them to come to the prenatal clinic early in pregnancy.

We are, at this time, treating our syphilitic pregnant women once a week. They get 0.45 of a gram of neosalvarsan and a mercurial inunction. Mixed treatment with protiodide of mercury and potassium iodide is started. This treatment is continued just as long as we are able to make the patient take it.

Of the 212 patients having no treatment, 106, or 50 per cent, produced full-time, apparently healthy babies. In the 138 treated patients, 101, or 73 per cent, went to term and delivered live babies.

A full term stillbirth occurred 14 times, or 6.6 per cent, in the untreated cases; in the treated cases 2 times, or 1.4 per cent.

Premature stillbirths occurred 58 times, 27 per cent, in the untreated cases and 10 times, or 7.3 per cent, with the treated.

Three babies of the treated cases had positive cord Wassermanns; two of these had had only one treatment and the other, four; treatments were begun late in pregnancy. No cord Wassermanns were made on seven of the treated babies, but the treatments were as follows:

- 2 had 1 treatment beginning about the ninth month
- 1 had 2 treatments beginning about the seventh month
- 1 had 2 treatments beginning about the eighth month
- 1 had 3 treatments beginning about the fifth month
- 1 had 6 treatments beginning about the fifth month
- 1 had 1 treatment beginning (?)

Of the 212 untreated patients 34 babies, or 16 per cent, were premature but alive. Twenty-three of these had negative cord Wassermanns; eight were strongly positive, and on three no test was done. Seven of these premature babies died in the hospital; four of these had a negative cord, two a positive, and on one the test was not done.

There were 27, or 10.8 per cent, premature live babies among the 138 patients treated. No cord Wassermann was done on three of these babies. On nine the test was strongly positive, weakly positive on one.

and on fourteen it was negative. Three of these twenty-seven babies died before leaving the hospital. The treatments given the mothers of the nine babies with positive cord Wassermann tests were:

- 2 had 4 treatments beginning about the eighth month
- 1 had 2 treatments beginning about the eighth month
- 1 had 5 treatments beginning about the sixth month
- 1 had 3 treatments beginning about the eighth month
- 1 had 1 treatment beginning about the third month
- 1 had 1 treatment beginning (?)
- 1 had 3 treatments beginning (?)

One had 18 treatments beginning about the fifth month. This premature baby died in the hospital.

The mothers of the 14 premature babies with negative cord Wassermanns had the following treatment:

MOTHERS	MONTH STARTED	NO. OF TREATMENTS								
		2	3	4	5	6	7	8	9	10
1	2							1		
1	3									1
5	6			1	1	1	1	1		
2	7		1	1						
3	8		2	1						
1	9	1								

One had two treatments, month not given.

The prenatal treatments of the mothers and the cord Wassermanns on the 101 full term babies born alive, follow:

On 5 babies the test was not done.

- 1 had 9 treatments beginning about the fifth month
- 1 had 7 treatments beginning about the fifth month
- 1 had 10 treatments beginning about the fourth month
- 2 had 6 treatments beginning about the eighth month

On 3 babies the test was weakly positive.

- 1 had 3 treatments beginning about the fourth month
- 1 had 4 treatments beginning about the sixth month
- 1 had 4 treatments beginning about (?)

On 12 babies the test was strongly positive.

MOTHERS	MONTH STARTED	NO. OF TREATMENTS						
		1	2	3	5	7	9	
1	2				1			
1	6	1						
3	7			1		1		1
5	8	1	2	2				

Two had 2 treatments, month not given.

The 80 mothers who had 81 full time babies with negative cord Wassermanns were given the following treatment:



The remaining 15 mothers had from 1 to 12 treatments each. The months in which the treatments were begun, were not recorded.

#### SUMMARY

Fifty per cent of the mothers who had no treatment had full term live babies.

Seventy-three per cent of the treated mothers had full term live babies.

In the nontreated cases 6.6 per cent terminated as full term stillbirths.

In the treated cases 1.4 per cent terminated as full term stillbirths.

In the nontreated cases 27 per cent had premature stillbirths.

In the treated cases 7.3 per cent had premature stillbirths.

In the nontreated cases 16 per cent of the babies were premature but alive. Seven of these babies died in the hospital.

In the treated cases 10.8 per cent of the babies were premature but alive.

The cord Wassermanns done on the babies of the untreated mothers were positive in 31 per cent.

The cord Wassermanns done on the babies of the treated mothers were positive in 19 per cent.

(Cord Wassermanns are rarely done on stillbirths. If routinely done this disproportion would be much higher.)

There were no severe reactions. The earlier treatment is started the more effective it will be.

61 FORREST AVENUE.



# THE UMBILICAL CORD ENCIRCLING THE NECK AND ITS RELATION TO INTRAPARTUM COMPLICATIONS

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THIS study is based upon 3,000 confinements at the University Hospital, of which number 814 (21.1 per cent) were multiparae, and 2,186 (72.9 per cent) primiparae. In the group there were forty-one twin pregnancies, nineteen occurring in multiparae and twenty-two in primiparae, which demonstrate the comparative frequency in multiparae as compared with primiparae. There were, then, 3,041 births in the series.

The position of the fetus in all cases has been divided into left or right sided. In thirty-three cases the position was not stated. The relative positions in multiparae and primiparae were found to be very nearly equal. The difference of 4 per cent in the left sided positions might be explained by the larger number of undifferentiated positions in multiparae which were all precipitate labors. (See Table I.)

TABLE I  
RELATIVE NUMBER OF POSITIONS IN MULTIPARAE AND PRIMIPARAE

POSITION	NUMBER	PER CENT	MULTIPARAE	(833)	PRIMIPARAE	(2208)
			NUMBER	PER CENT	NUMBER	PER CENT
Left	1903	62.6	497	59.8	1406	63.6
Right	1105	36.3	309	37.0	796	36.1
Not stated	33	1.1	27	3.2	6	0.3

Cephalic and breech presentations have been grouped together in order that the tables prepared might not be too cumbersome. The above figures are practically the same as those of Williams and other accepted authorities.

In 482 cases (15.8 per cent) the umbilical cord encircled the neck. This percentage seems to be lower than in series studied in other clinics. Williams states that it occurs about once in every four deliveries. G. Veit, in 2250 cases, found the cord around the neck on 442 occasions or about 20 per cent. Hecker and Ohlfeld reckoned the percentage about the same, while Von Winekel thought the percentage was slightly higher. Bruttan in 500 cases found it in 29 per cent. In our series the condition was present 152 times or in 18.3 per cent of the multiparae, while it was present in 330 or 14.9 per cent of the primiparae. We are inclined to explain our relatively low percentage of cases by the fact that a large majority of our cases were primiparae, while in most clinics the great majority of patients are multiparae. Our own statistics show that the condition occurs 3.4 per cent more often in multiparae than in primiparae.

In considering the number of coils around the neck in each case, it was found that the cord encircled the neck only once, four times as frequently as it did twice, three times and four times combined. The percentage of the respective number of coils as compared with the total was as follows: One coil, 78.6 per cent; two coils 18 per cent; three coils, 2.7 per cent; and four coils, 0.7 per cent. Smoliboeki in 1000 births in the Breslau clinic found 125 cases with the cord encircling the neck. He found one coil in 74.5 per cent of cases, two in 12.3 per cent and three in 3.2 per cent. Weidemann, in 3,379 cases where the cord was around the neck, found it encircled only once in 76 per cent. Smoliboeki makes no note of any case where there were more than three coils. We noted three cases where there were four coils but none with more than this number. However, cases with many more coils about the neck have been reported. Strassman observed a case with five coils; Winekel saw a case with six coils; Wygotski one with seven; Credé a case with eight; and Gray reported a case where it was nine times around the neck. In our series all numbers of coils were found to be more frequent in multiparae, with the exception of the three coil group where it occurred five times more frequently in primiparae. This was looked upon as a coincidence. (See Table II.)

TABLE II  
RATIO OF COILS IN MULTIPARAE AND PRIMIPARAE

PARA	ONE COIL		TWO COILS		THREE COILS		FOUR COILS		TOTAL	
	NUM- BER	PER CENT	NUM- BER	PER CENT	NUM- BER	CENT PER	NUM- BER	PER CENT	NUM- BER	PER CENT
Multiparae	119	14.3	30	3.7	1	0.1	2	0.2	152	18.3
Primiparae	260	11.8	57	2.5	12	0.5	1	0.1	330	14.9

A rather remarkable finding was the total number of cases where the cord encircled the neck in relation to the position of the fetus in the pelvis. This condition of the cord was found 6.2 per cent more frequently in right sided than in left sided positions. This is nearly one and one-half times as frequent. We are unable to give any satisfactory explanation for this seemingly great difference.

TABLE III  
NUMBER OF COILS IN RELATION TO POSITION

POSITION	NUMBER	PER CENT
Right	220	19.9
Left	260	13.7
Not stated	2	6.0

In left sided positions there was only 1 per cent difference in the frequency of the condition in multiparae and primiparae. The greatest difference was found in right sided positions where in both mul-

tiparae and primiparae the condition was present much more frequently than in cases of the opposite side. But in multiparae it was present in 7.4 per cent more cases than it was in primiparae; that is, it occurred in more than one quarter of all multiparous births where the position of the fetus was right sided.

TABLE IV  
RATIO OF COILS IN RELATION TO POSITION

PARA	LEFT		RIGHT		NOT STATED	
	NUMBER	PER CENT	NUMBER	PER CENT	NUMBER	PER CENT
Multiparae	72	14.7	78	25.5	2	9.6
Primiparae	188	13.4	142	17.8	0	0

Again we must admit we are unable to explain this finding unless the cord is more frequently placed around the neck in such a way as to rotate the fetus toward the right side. This seems rather improbable and as we have no data regarding the direction in which the cord enircles the neck, it remains merely an opinion. Further study on this particular phase of the subject is being started and we hope to be able to give some definite findings in the future.

There was a total of forty-eight cases of persistent occiput posterior position. Of this number the cord enircled the neck in fifteen cases or 31.2 per cent. Although the percentage is not very high it is very suggestive that the cord enirceling the neck may cause some deflection in the attitude of the fetus, causing the rotation posteriorly. Winekel states that he believes the condition may be the cause of many cases of malposition.

In the 3,041 births there were eighty-nine cases of asphyxia neonatorum. There were twenty-three cases of asphyxia pallida and sixty-six of asphyxia livida. All cases were considered as asphyxia where the infant did not breathe without some kind of artificial stimulation, although this measure was not resorted to in many cases for a considerable period of time. There were sixty-one stillbirths in the series, of which eighteen were among the cases also considered as asphyxia.

In only two cases of the total number of asphyxias and stillbirths were we able definitely to attach the etiology of the condition to the umbilical cord enirceling the neck. Curiously also, these were the only cases in which the condition might have been the cause of dystocia.

CASE 1.—Mrs. R. E., age forty-one, white, housewife, para xi. Previous pregnancies and labors uneventful. Labors usually lasted about one hour with first excepted, which was about six hours in length. Patient went into labor at term and after an hour and a half the cervix was found to be fully dilated. The pelvis was normal. The position was O. R. A. and the head was found to be floating. Five minutes later the membranes ruptured. The contractions kept up and were severe in character but there was no advance of the head. After an hour and twenty

minutes the head began to descend to the perineum. After the birth of the head it was found that there was a very tight coil of cord around the neck which was pushed over the shoulder with difficulty. On the birth of the baby it was found that there was no pulsation of the cord nor could any heart action be detected. The fetal heart was regular twenty-five minutes before the baby was born. On examination of the cord it was found to be congested and contained large clots from the umbilicus to the point where it encircled the neck a distance of 13 centimeters. From that point to its placental attachment the cord was collapsed and slightly greenish in color. As the baby weighed only seven pounds and as there was no evidence of any moulding, it was thought quite possible that the cord might have had something to do with the relative increase of the second stage of labor. However, this is difficult to explain for the cord was 83 centimeters in length.

CASE 2.—Miss E. D., aged seventeen, school girl, para i, at term. Pregnancy normal. Pelvis normal. Position O. R. A. The membranes ruptured when the patient went into labor. After nine hours the cervix was fully dilated. The head was high in the pelvis and remained stationary for more than an hour, then began to descend. At this time it was noted that the fetal heart which had been regular up to this time had disappeared. The labor was allowed to go on normally as the baby had obviously died. The perineum dilated slowly and after the birth of the head a very tight coil of cord was found around the neck. It could neither be pulled down nor pushed over the anterior shoulder. It was therefore clamped and cut. It was found to be congested and blue from the umbilicus to a point 7 centimeters beyond the clamp on the maternal side, and collapsed from there to the placenta. The total length of the cord was 59 centimeters. The baby's head was very slightly moulded. It weighed six and three-fourths pounds.

Although we could not prove this relatively short cord, considering the coil around the neck, was the cause of the arrest of the fetus in a normal position and attitude, the evidence points in that direction. However, there seems to be little room for doubt that it was the cause of the intrapartum death of the fetus.

A case is reported from Credé's clinic where the cord was so tight that the neck was only the thickness of the finger. In neither of our cases could any imprint of the cord be made out on the neck after the birth of the child. Hillairet saw a three months fetus with a coil of cord around the neck so tight that the neck was only 1 mm. in thickness. Other cases of strangulation have been reported by Bartseher, Blume, Fraenkel and others. Strassmann reported a case which he called intrauterine suicide, in which the fetus was born dead fourteen days before term. The cord was very tight about the neck and was thought to be the cause of death. R. Meyer showed in a 12 cm. fetus that there was engorgement of the cord on the fetal side of the loop and the right umbilical artery was ruptured. Of course the above cases are mostly of antepartum death but there is every reason to believe that many of the same conditions may obtain in intrapartum death. Antepartum complications were very thoroughly investigated by Browne recently. Winckel believes that a coil or coils of cord about the neck may produce deflection attitudes, hinder descent and rotation and prevent descent of the shoulders. He also believes that the condition may cause bleeding from premature

placental separation, rupture of the cord and even inversion of the uterus.

### CONCLUSIONS

1. The umbilical cord encircles the neck more frequently in multiparae than in primiparae.

2. The umbilical cord encircles the neck nearly one and a half times more frequently in right sided than in left sided positions. This is particularly noticeable in multiparae.

3. In occasional instances the umbilical cord encircling the neck may cause dystocia, either from causing deflection attitudes or traction, and many other complications.

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## BLOOD DYSCRASIA COMPLICATING PREGNANCY AND PUERPERIUM, WITH A REPORT OF TWO CASES\*

BY SOLOMON KRELL, M.D., NEW YORK CITY

**CASE 1.**—A woman of nineteen, born in Armenia; in United States five years. Ten years ago patient was sick for one month with fever, during which time she was exceedingly pale. A diagnosis was made of "pale sickness" which, in Armenia, is the popular term for malaria. She apparently made a complete recovery from that ailment. Menstrual history normal. Gravida 2, para 1, miscarried at 3 months one year ago. Soon after she became pregnant, she was very pale and weak. These symptoms, however, cleared up following a spontaneous abortion and she regained her normal health within a month.

**Present Illness.**—Last menstrual period began Dec. 25, 1924, labor expected Oct. 1, 1925. Patient felt well throughout pregnancy except for slight nausea and vomiting in the first three months. About three weeks before admission to the hospital patient stated that she, as well as her friends, noticed that she was growing pale. Except for a slight feeling of weakness she had no other complaints until she entered the hospital. July 28, 1925, examination revealed a systolic murmur at the right base and a blood pressure of 130 over 40. She was seen once more on Aug. 18, 1925, at which time she felt well. No mention is made on the chart of any pallor. Urine negative. On Aug. 30, 1925, patient was admitted to the hospital in labor. She was delivered of a normal male baby, breech presentation, seven hours after admission.

When patient was first seen at the hospital she presented the appearance of one who had just suffered a severe hemorrhage. Her face was extremely pale with a

\*Presented at a meeting of the Section on Obstetrics and Gynecology of the New York Academy of Medicine, December 22, 1925.

somewhat yellowish tinge; her lips were almost white, yet, curiously enough, she complained of hardly any weakness or indeed of any other discomfort except her labor pains. Blood pressure was 150 over 80, no bleeding from anywhere. Spleen was not palpable; slight swelling of the ankles. Blood examination (before delivery), R. B. C., 1,350,000; Hgb., 28; W. B. C., 2,400; polymorphonuclear leucocytes, 32; lymphocytes, 68. There was anisocytosis, polychromatophilia, poikilocytosis and a few normoblasts. Urine showed albumin one-plus, acetone two-plus.

The following day the hemoglobin dropped to 15 with less than 1,000,000 red cells, her temperature rose to 101.5°, pulse 90, respiration 30. Five hundred c.c. of citrated blood were given intravenously Aug. 31, 1925. The day after the transfusion her temperature rose to 103°, then dropped sharply to 99° and from then on until her exitus it varied from 101° to 106°. On several occasions preceding a sharp rise in temperature patient had a chill that lasted a half hour.

Following the transfusion her hemoglobin rose to 25, and within two days dropped back to 15. Two days after the first transfusion a blood examination showed bleeding time forty minutes; clotting time fourteen minutes; bilirubin dilution 1 to 150; cells, one-fourth volume of total blood; no clot retraction after two and one-half hours; platelets 64,000; Van den Bergh test positive for indirect reaction. The smear presented the same characteristics as on the previous examination.

September 6, 1925, a second transfusion of 500 c.c. of citrated blood was given. Again there was a slight rise in hemoglobin which dropped back to 15 in two days. During this time her spleen became palpable, patient was losing ground perceptibly, uterine bleeding increased, pulse grew weak and she became moribund. Four days later a splenectomy was performed preceded and followed by transfusions of whole blood. Soon after the operation uterine bleeding increased, hemoptysis and epistaxis set in, pulse grew weak, and respiration became labored. She expired within forty-eight hours after the operation.

The necropsy showed acute degenerative cardiac changes and emboli with petechial spots scattered over the endocardium. The lungs presented pulmonary edema and a small infarct. The liver showed acute degenerative changes, the kidneys an acute nephritis. The uterus showed an acute, septic endometritis. The spleen weighed 260 gm., consistency was normal and microscopic examination showed evidence of sepsis. Uterine and splenic cultures revealed *Streptococcus hemolyticus*.

The baby was discharged in normal condition.

*Discussion.*—The patient remained in the hospital long enough to allow a thorough investigation of the case, yet the various antemortem examinations together with the advantages of a partial autopsy did not help to establish an exact diagnosis. The postmortem findings together with the mode of death clearly suggest sepsis. But the woman came to our notice with a blood condition well advanced towards an unfavorable outcome, and if that blood condition was not directly responsible for the actual death, it was certainly the determining factor in the production of complications. The history of the case with all the findings is by no means indicative of any sharply defined blood disease. The onset, particularly its occurrence during pregnancy, would suggest an acute pernicious anemia. The blood picture, however, does not bear out this diagnosis. For pernicious anemia is essentially a megaloblastic anemia, and no megaloblasts were found in any of the smears, nor was the hemoglobin index as high as is commonly found in pernicious anemia. The next disease

that would suggest itself is purpura hemorrhagica. Here the blood findings are more consistent, particularly the fact that the platelets were found so low in number, as well as the prolonged bleeding time and absence of clot retraction. The one serious objection to this diagnosis is the absence of purpura. It must also be remembered that the patient did not bleed from any part of the body until after delivery when it was noticed that the uterine bleeding was excessive. Hemorrhage from other mucous membranes did not set in until shortly before death. A diagnosis of purpura hemorrhagica in the absence of the two most outstanding clinical features of this disease is unwarranted.

Another diagnosis considered was acute lymphatic leucemia. Here both clinical and laboratory findings are highly suggestive since on repeated examinations the lymphocytic count was high. But we also had smears that showed a lymphocytic count of not more than 30 and such findings were not discovered shortly before death as is sometimes the case with leucemia. Banti's disease, we believe, can be easily ruled out for the reason that neither the clinical nor the pathologic features pointed to this. It must be remembered that Banti's disease is essentially a chronic ailment with enlargement of the spleen preceding the anemia and liver changes and ascites late in its course.

We are forced to conclude that we are here dealing with a toxemia of pregnancy which manifested itself chiefly in the form of a blood dyscrasia. The signs of sepsis which complicated the picture in the puerperium must be looked upon as secondary to a blood condition which was dangerously approaching a state of incompatibility with life.

Tice describes a condition which he calls "hemolytic anemia of pregnancy." This resembles our case in many respects. For want of a more plausible or more certain diagnosis we conclude that ours is a case of this type.

CASE 2.—A woman of twenty-four, nativity Russian, eleven years in United States. Admitted to hospital June 1, 1925, in labor.

Her last regular menstrual period began Aug. 7, 1924; labor expected May 14, 1925. Patient felt weak throughout pregnancy and suffered with frequent headaches which she attributed to some pills taken in the second month to bring on menstruation. Menstruation began at thirteen, periods irregular, coming on at three- to five-week intervals, flow lasting five days, dysmenorrhea the first two days.

Patient stated she was always prone to bleed profusely from the slightest cause, particularly so after her last confinement.

On April 16, 1925, swelling of feet was noticed and petechial spots scattered over the body. Blood pressure was 150 over 80. During her later visits to the prenatal clinic she complained of headache, weakness, ecchymotic spots over the body and bleeding from the gums. Urine showed a faint trace of albumin and a few red cells. Patient went into labor June 1, 1925, and was delivered the same day of a normal male child.

On admission to the hospital, patient had a yellowish pallor, body and extremities

were covered with petechial and ecchymotic spots ranging in diameter from  $\frac{1}{8}$  to  $\frac{1}{4}$  cm. Mucous membranes were pale. Heart sounds were normal except for an accentuated second pulmonic. There were occasional crepitant râles over both bases.

Blood examination showed: R. B. C. 2,400,000; Hgb. 30; W. B. C. 15,000; polymorphonuclear leucocytes 80; lymphocytes 20. Smear showed anisocytosis, poikilocytosis and normoblasts. Up to June 27 blood examination varied: R. B. C. from 1,500,000 to 3,000,000; Hgb. from 30 to 50; bleeding time from 3.5 to 32 minutes; clotting time from 3 to 10 minutes; platelets from 40,000 to 50,000. There was always a moderate leucocytosis with an increased polymorphonuclear count. These variations were probably influenced by the blood transfusions which she received at frequent intervals.

After June 27 we observed a steady decrease in red blood cells, a lowered hemoglobin, increased bleeding time, decreased number of platelets and poor clot retraction. Patient was bleeding from the gums and blood was found in the urine and stool. As the disease progressed uterine bleeding increased.

Temperature on admission was normal, soon after delivery it rose to  $101^{\circ}$ ; on third day postpartum it rose sharply to  $105^{\circ}$ ; from then on it was irregular ranging from  $100^{\circ}$  to  $103^{\circ}$ .

Between June 6 and July 8 patient received six transfusions with only transitory improvement in general condition and blood picture. She was also given horse serum and human blood intramuscularly, calcium lactate orally, x-ray over the spleen and tonic and supportive treatment. None of these therapeutic measures were of any avail; new crops of petechiae continually appeared. The second week in July the patient began to lose ground rapidly; uterine bleeding increased, heart action weakened and on July 12 patient expired. Baby was discharged from the hospital in normal condition.

This is a case of purpura hemorrhagica complicating pregnancy and puerperium.

*Discussion.*—A review of the literature shows that purpura hemorrhagica is an exceedingly rare complication of pregnancy, only 39 cases having been reported up to 1923. In a report of a similar case G. C. Mosher reviews eleven others reported in the literature. It appears that the complication occurs most often in multiparae; the attack usually becomes manifest between the sixth and seventh months of gestation with a purpuric rash and bleeding from various parts of the body. The outcome, particularly if the patient goes to full term is generally fatal, death occurring from within a few days to a few weeks postpartum. The baby as a rule is normal.

A comparative study of the two cases of this report reveals points of unusual interest. While the predominating feature of both cases is the severe grade of anemia and while the gestation in both instances probably bears an etiologic relation to the anemias, there is nevertheless a decided difference between the two. Whereas the first case entered the hospital in her eighth month without any history of loss of blood, the second patient showed the main features of a purpura hemorrhagica two months before she was delivered. It is fair to assume that the anemia of the second case was at least in part caused by the loss of blood from the gums and into the skin. The first patient, on the other hand, reached an alarmingly severe type of anemia



without having lost any blood. Evidently in this case direct insult was suffered by all the formed elements of the blood giving rise to a picture not unlike that of an aplastic anemia. Another point corroborative of the secondary nature of the anemia in the hemorrhagic purpura case, is the constantly high leucocytic count as contrasted with the decided leucopenia of the first case.

Practically all authorities agree that in the severer grades of anemia incident to pregnancy, transfusions yield prompt and satisfactory results but where the blood dyscrasia assumes the character of an aplastic anemia or purpura hemorrhagica, the outlook is very gloomy and in most instances hopeless.

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1802 CLINTON AVENUE.

# Department of Maternal Welfare

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CONDUCTED BY FRED L. ADAIR, M.D.

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## MATERNAL MORTALITY: THE RISK OF DEATH IN CHILDBIRTH FROM ALL DISEASES CAUSED BY PREGNANCY AND CONFINEMENT

THIS report, the work of Dr. Robert Morse Woodbury, formerly director of statistical research for the Children's Bureau (*United States Department of Labor, Children's Bureau, Publication No. 158, 1926*) brings together and analyzes all available material, both American and foreign, on deaths of mothers during childbirth and is considered one of the most important pieces of recent research in the field of the Bureau's work. Children's Bureau officials feel that it indicates the necessary emphasis during the coming decade in the effort to reduce deaths among both babies and mothers.

*High Maternal Mortality Rate in the United States.*—Maternal mortality rates in the United States are today among the highest in the civilized world and only a slight decrease in these rates has occurred since the beginning of the present century, Dr. Woodbury's report states. The significance of these facts from a national point of view is found not only in the loss which this means of the lives of women presumably in their prime, but also in the far-reaching effect of maternal mortality on the infant death rate. Dr. Woodbury points out:

"A very considerable proportion of all deaths of infants under one year of age occur during the first month of life from causes which have their origin in the care and condition of mothers during pregnancy and confinement. In the United States as a whole it may be estimated that approximately 100,000 deaths of infants under 1 month of age occur every year. Reduction in the mortality from these causes depends upon improvement and extension of facilities for prenatal, confinement, and postnatal care. It may also be estimated that at least 100,000 stillbirths occur each year. The same measures which will safeguard the lives and health of mothers during pregnancy and labor will also tend to reduce the stillbirth and neonatal mortality rates."

Dr. Woodbury estimates the total annual number of maternal deaths in the United States on the basis of 1921 birth-registration area statistics to be 18,281. However, a careful survey of sources of error in certifications of death throughout the area leads him to the conclusion that the true number of maternal deaths is probably as much as 12 per cent in excess of those reported, making an estimated yearly death toll of more than 20,000 women. The maternal mortality rate in 1921 was 6.8 per 1,000 live births. The provisional 1924 rate was 6.6.

*Trend of Maternal Mortality Since 1900.*—Figures showing the trend of maternal mortality over a twenty-two year period in the United States, if accepted at their face value, would show an increase in the maternal death rate from 13.3 per 100,000 population in 1900 to 16.9 in 1921, according to the report. However, analysis of various factors affecting these statistics, particularly the campaign for better certification of the causes of death during recent years, would indicate in reality a "very slight downward trend" since 1900.

Comparison of the United States rates with those of other countries shows that the United States ranks among those having the highest rates, such as New Zealand and Chile. Among the countries having rates less than half that of the United States are Denmark, Finland, Italy, Japan, the Netherlands, Norway, Sweden, and Uruguay.

*Causes of Maternal Mortality.*—Analysis of the causes of maternal deaths in this country shows that the most important single cause is puerperal septicemia, due to infection resulting from lack of surgical cleanliness and almost 100 per cent preventable through careful asepsis. Two-fifths of the maternal deaths in the death-registration area of 1921 were due to septicemia. Among other causes, puerperal albuminuria and convulsions were most important, contributing over one-fourth of the deaths. This cause is preventable through competent medical care during the prenatal and confinement period. Other causes of death included accidents of pregnancy, hemorrhage, accidents of labor.

Factors affecting the risk of maternal death are analyzed by the report. Statistics indicate that the risk of death to the mother is greater in the case of plural than of single births and greater for mothers under fifteen and over forty-five years of age than to those between fifteen and forty-five. The lowest mortality is found among mothers between twenty and twenty-four. Maternal mortality, like infant mortality, is higher in first births than in second, third or fourth births, lowest of all for third births, and gradually higher with each birth after the third until the maximum death rate is reached with the eighth and later children.

*Poverty an Important Factor.*—As with infant mortality also, poverty is found to be an important factor in maternal death rates, these increasing as the husband's earnings fall, probably because of lack of proper facilities and adequate care for the poor mother. Color and nationality are also important factors in maternal mortality. In the birth-registration area for 1921 the negro maternal death rate was 67 per cent higher than the white rate. On the other hand, the rate for foreign-born white mothers was slightly lower than that for native white mothers. Among the nationalities included in the foreign-born white group, the rate was lowest for mothers born in Russia, and next to lowest for mothers born in Italy. At the other extreme were the rates for mothers born in Ireland, Great Britain, Canada, Hungary, and Germany. The racial stocks represented in the nationalities for which the rates were highest are, it is pointed out, those which principally compose the native white population.

*City and Country Rates.*—Cities showed a higher maternal mortality rate than rural districts in the United States, according to the 1921 figures, but to some extent this difference is to be accounted for by the fact that many of the more difficult or complicated cases are brought from rural regions into cities in order to secure the better medical and hospital facilities of the city. The classification of cities into groups according to size brings out the interesting fact that the highest mortality from puerperal septicemia was found not in the large centers but in the group of cities which had populations of 25,000 to 50,000. Except for the rural areas the largest cities had the lowest rate.

*Maternal Mortality Largely Preventable.*—The preventability of maternal mortality is considered in the light of the analysis of causes and causal factors, by the Children's Bureau report. "Almost all the mortality from puerperal septicemia is preventable," the report states. "Puerperal septicemia is infectious in origin, and its prevention depends upon the rigorous observance of asepsis. The Australian committee appointed to study the causes of death and invalidity in the Commonwealth states: 'Puerperal septicemia is probably the greatest reproach which any civilized nation can by its own negligence offer to itself. It can be prevented

by a degree of care which is not excessive or meticulous, requiring only ordinary intelligence and some careful training.'''

*Recommendations for Prevention.*—For the prevention of the most important causes of maternal deaths the essential recommendations by the Bureau are: Effective supervision by a public-health agency over hospitals and over the training and admittance to practice of physicians, midwives, and nurses, and the requirement that all cases must be reported, as in the case of other infectious diseases. The experience of Norway is cited. In that country puerperal septicemia was early made a reportable disease and measures of public control were instituted. The result has been the elimination of four-fifths of the cases of the disease and the virtual elimination of deaths from it. Similar striking decreases have occurred in England and Wales and the Netherlands. Of special interest as a demonstration of what can be done in a large city in this country are figures from New York City showing a steady drop in the rate from 4.1 in 1900 to 2.5 in 1921, a rate still considerably higher than those for the countries mentioned, however.

Other puerperal causes of death may be prevented in a large proportion of cases by proper prenatal and natal care of the mother. Studies in this country, including the demonstration in New York City of the Maternity Center Association and the Henry Street Settlement, as well as evidence of physicians and public health authorities here and abroad, have shown the value of competent medical supervision in the reduction of rates from these causes.

The problem of prevention is, therefore, summarized by the Children's Bureau report as that of insuring to every mother skilled assistance before and during childbirth. The question of the extent to which mothers in the United States are today receiving such care is discussed on the basis of the scattered information available. In Baltimore, in 1915, with an excellent medical school and hospital and well-developed clinics, nearly half of all married mothers having babies during that year had no medical prenatal care of any kind and only 5 per cent had received care that could be classified as Grade A. In Gary, Ind., in 1916, 70 per cent of the mothers had not received any medical prenatal care. In rural districts studies indicate on the whole an even smaller proportion of mothers receiving prenatal care. Although these studies, made by the Children's Bureau, relate to a period from four to eight years ago, and the campaign of popular education on the subject as well as the establishment of prenatal clinics had probably increased somewhat the percentages of mothers receiving adequate medical attention during the period before the birth of their babies, even yet the proportion is, according to the Children's Bureau, probably very small. Attendance by physicians at the birth of the baby is reported for larger proportions of mothers, varying from 97 per cent in Nebraska to 51 per cent in Louisiana. Evidence is not available, however, as to the qualifications of the attendants at birth. Postnatal care is reported on for the cities of Baltimore and Gary and shows that a large proportion of the mothers did not receive supervision after birth.

#### A PREVENTIVE PROGRAM

The preventive program suggested by the report, in its main outline, follows:

1. Regulation of the practice of obstetrics, by requiring a license to practice from both physicians and midwives, by establishing minimum requirements for obtaining such a license, and by defining and prescribing penalties for malpractice.
2. Regulation of public and private hospitals and maternity homes through legal provisions governing the establishment of such institutions and requiring that they be licensed and subject to inspection.
3. Legislation for the control of venereal diseases including the making of these diseases reportable.

4. Requiring that puerperal septicemia be made reportable, as is now the case in a number of states.

5. Provision through governmental or public sources of better facilities for training medical and nursing personnel and more adequate clinics, hospitals, and maternity homes.

6. Subsidies in aid of state or local activities by federal or state governments, as in the United States during the past four years through the Maternity and Infancy Act.

7. Educational work directed toward informing mothers of the need of adequate maternity care.

F. L. ADAIR.

# Society Transactions

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## OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF FEBRUARY 4, 1926

(Continued from December, 1926, issue)

DR. B. G. M. ASTLEY read a paper on **Spinal Anesthesia**. (For original article, see page 83.)

### DISCUSSION

DR. J. O. ARNOLD said he used the procedure rather extensively in a considerable variety of cases, including forceps deliveries, cesarean sections, and other operative work, until he became pretty well acquainted with the technic and the class of cases in which it was of most value.

He thought that with this, and the more recent intravenous use of magnesium sulphate, we have made some very real progress in the handling of our eclampsies, and in the treatment of the graver toxemias.

In the past year or more he discarded the use of morphine and other narcotic drugs, and substituted entirely the intravenous use of magnesium sulphate, and this, together with the use of spinal anesthesia where immediate delivery by cesarean section is indicated, was undoubtedly giving better results, and proving to be more nearly the ideal method of treatment. In the cases reported by Dr. Astley, which are only a few out of a much larger series that have had spinal anesthesia, there was a special indication for this method. Not only is this true as regards its value in helping to save the premature, or otherwise endangered child, but it certainly has decided advantages over other methods of anesthesia in its relationship to early and efficient elimination after operation.

In this respect there appears to be something in common between magnesium sulphate intravenously and spinal anesthesia. Both seem to favor rather than hinder elimination. Normal, or effective elimination, is resumed earlier, and patients clear up quicker mentally, and this greatly aids in their further treatment.

This was very well illustrated only a few days ago, in an eclamptic patient brought in by ambulance, unconscious for hours, and having exceptionally violent convulsions. After venesection and two intravenous doses of magnesium sulphate, she had but one more convulsion, and in less than three hours was conscious and clear mentally; her kidney elimination began remarkably early and satisfactorily. She did not require an anesthetic for delivery, but there would have been no fear that spinal anesthesia would have hindered these good results, had its employment been necessary.

Dr. Astley referred to two cases that were of such unusual interest that Dr. Arnold wanted to say more about them,—the two patients that had acute hemorrhagic nephritis.

In one of these the hope of saving the mother was extremely small. She was practically moribund and the operation was only successful in saving the child. This baby weighed less than three pounds, was very much premature, and frail. She is now more than three years old and a strong, hearty child.

In the second case, the pregnancy had not reached six months and there was no hope of saving the child. The mother had rapidly become desperately ill following

an acute influenza. Spinal anesthesia certainly did save the mother as he did not believe she could have been as quickly and as safely delivered by any other method. Even local anesthesia would have taken more time where time was an extremely important factor, and would not have given the beneficial after-effects on kidney elimination that were so marked in this patient and that practically always do result so much more promptly after spinal anesthesia than after any other.

The ease and help that this method gives to the operation itself is by no means an unimportant factor. The uterus contracts well, and there is less hemorrhage, and one can operate more quickly and more satisfactorily. There is also a very noticeable absence of the gastrointestinal and other postoperative disturbances and this is no small item in the welfare of desperately ill patients.

DR. J. STUART LAWRENCE said that if this study has been offered from the standpoint of an operating anesthesia that renders the radical treatment of eclampsia more safe it is very interesting; but if the study has been offered as one more reason for the radical method of treating eclampsia, then it is not so satisfactory. The radical treatment of eclampsia is based on fallacy as to etiology, and that in a mortality larger than 15 per cent. It is very possible for a small series of twelve to fifteen cases to show a smaller mortality than 15 per cent, but no large series has been shown, except that phenomenal series Freund reported in 1908 for which he scoured Europe; he collected a number of cases and operated on them within one or two hours of first convulsion. The best mortality record to my knowledge, in the treatment of eclampsia, belonged to the conservative treatment; that is, the treatment of the Rotunda plus the method advised by Titus, of Pittsburgh, plus the suggestion Dr. Williams made two years ago, for in a large series of cases there is a mortality of 8.75 per cent.

DR. RICHARD C. NORRIS said that there are two distinct topics for discussion: the treatment of the preeclamptic state and of eclampsia, and what anesthetic shall be used for cesarean sections, especially in eclampsia. Now as to cesarean section for eclamptic cases, it takes large numbers of cases, as the Doctor has said, to obtain worthwhile conclusions. Stroganoff's expectant treatment has a mortality around 8 per cent, Dührssen's vaginal hysterotomy, for the preeclamptic and the eclamptic patient, so popular a few years ago, showed a total mortality of about 8 per cent. These are the best statistics that have been offered and they represent the extremes of routine operative and nonoperative treatment. Eclampsia varies in its manifestations and varies so much in the extent of pathologic conditions in the patient that one cannot be too careful in drawing conclusions as to the value of a routine plan of treatment. Dr. Norris repeatedly operated on comatose eclamptic patients without any anesthetic. Some of them have recovered and some have died. The pendulum of prompt surgical treatment swings in one direction and swings back again, all of which means that we do not know in which cases it may be necessary, in which it may be harmful. We cannot differentiate accurately the degrees and types of toxicity with certainty, and then declare that a particular case requires cesarean section. The condition of the soft parts is perhaps the most important guide. The question of infant mortality depends upon how gravely toxic the mother is and upon the prematurity of the infant.

Dr. Arnold referred to his three-pound baby. A year after premature babies are born is the time for studying the infant mortality. If we study a large group of eclamptic mothers giving birth to premature and toxic babies, even by cesarean section, it will be found, at the end of a year, that a large proportion of these babies will not be alive. We know that is true when the mothers do not have eclampsia. It is one of the disadvantages of induction of labor, in preeclamptic mothers prior to term. Cesarean section is the most rapid method of opening the birth canal, and there are obstetric complications that require opening the birth

canal by this rapid means, but relatively few eclampsia cases belong in this class. The condition of the soft parts, in the presence of obstetric emergencies, determines what means one shall employ in the vast majority of cases. The important problem is, how necessary is speed in the delivery? In eclampsia, in Dr. Norris' judgment, it is not nearly so necessary as in central placenta previa or accidental hemorrhage. Resort to this method of opening the birth canal for all cases of eclampsia will not show in the future any better results than in the past. We must know more about the pathology,—the intimate pathologic changes in the individual case, before we can assert the necessity for rapid delivery. The mere rapid emptying of the uterus in the vast majority of cases in eclampsia amounts to very little in saving life. He had seen patients die just as quickly after the rapid, as after the slower methods and others survive, usually, however, when the type of toxemia was not severe. The mortality of severe cases after cesarean sections is almost double that of less aggressive methods. Because a woman is eclamptic, has had a greater or less number of convulsions, is or is not comatose, is not the indication. Dr. Arnold spoke of prenatal care and there lies the important treatment of eclampsia—its prevention. At the Preston Retreat toxemia cases have been reduced over one-half; however, some cases of the fulminating type continue in spite of careful prenatal work. Spinal anesthesia as a routine means of anesthesia did not appeal to Dr. Norris as having any special advantage over local anesthesia in eclampsia, and he believed that in a large group of cesarean sections it would not show as low a mortality as nitrous oxide and oxygen. When all surgeons of experience accept spinal anesthesia as a routine procedure it will be in order to use it for cesarean sections.

Dr. Norris did not doubt that as time goes by we shall be doing cesarean sections more and more, as a safe means of opening the birth canal. The important thing is to learn when it is necessary. Proof must be forthcoming that spinal anesthesia is of specific advantage in eclampsia before he would accept it as less dangerous than nitrous oxide. Cesarean section is one of the easiest operations and much less difficult from the standpoint of abdominal wall relaxation from the anesthetic. For that reason one of the disadvantages of nitrous oxide does not obtain. All his experience and knowledge acquired from the experiences of others, made him believe that cesarean section is only exceptionally indicated in the treatment of eclampsia. For a primipara with no effacement of the cervix, rigid soft parts, and the fulminating type of eclampsia which the clinical history and study indicate as probably of hepatic or endocrinal origin, cesarean section may be justified, while carrying out the appropriate medical and intravenous treatment.

DR. ASTLEY said in closing that he tried to make clear that this was an individual method. He supposed Dr. Arnold and he had cases in which spinal anesthesia was not used. Dr. Norris stated the method of spinal anesthesia is still *sub judice*. He admitted that it is in some situations. As a protection against nerve shock Dr. Astley believed local anesthesia is all right, but who would like to do a cesarean section on a patient in a convulsion? A local anesthetic will not serve if your patient has a convulsion on the table. When under spinal anesthesia if a convulsion develops, the patient will be convulsed from her nipples up and the anesthetist can put a mouth gag in place and you can keep on doing the work. He believed because of collected statistics in this group of individuals over 30 years of age whose cervixes are long, whose soft parts are unyielding and where one can ordinarily make no promise of a child, the family can be told of a method of anesthesia which does not add danger to the mother as much as ether or chloroform, or gas and oxygen and have an anesthetic which we are confident has less danger to the child than any other. Dr. Astley felt that the position taken is worthy of consideration. He would say that these patients who did die were the most complicated cases, one with eclampsia and lobar pneumonia coexistent, the other of a comatose type.



# Department of Reviews and Abstracts

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CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

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## Selected Abstracts

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### Endocrinology and Ovarian Transplantation

Benthin, W.: The So-Called Puberty Gland. *Medizinische Klinik*, 1924, xx, 169.

There is no agreement concerning the claim that the interstitial cells of the ovary in the human exert a protective influence on the maintenance of the female sex characteristics and on sex life. Experiments with x-rays and a review of the literature have made the author doubtful of the existence of the so-called puberty gland, a term applied to the fat-containing theca interna cells which surround atretic follicles.

Physiologically the interstitial cells are most numerous before puberty, but with the advance in age they become more and more insignificant. Even as early as the thirtieth year the number of primary follicles is small. There is an increase in the number of interstitial cells just before the menses and during pregnancy.

The formation of new interstitial tissue does not end with the menopause for although the formation of corpora lutea may cease, follicles still remain. In pathologic conditions, a hyperemia which affects the follicle apparatus will lead concomitantly with the increase in follicle atresia to an increase in the interstitial tissue. This explains the preponderance of the latter tissue in cases of chorioepithelioma, soft myomata and acute pelvic infections.

In some animals, as the rain worm and amphibians there is no interstitial tissue at all. Hence the secondary sex characters are dependent upon the sex cells alone.

The interstitial tissue cannot be the cause for the maintenance of size and function of the uterus because the interstitial tissue is best developed before puberty and is still present in advanced old age after the uterus has been atrophied a long time. Furthermore, after x-ray castration, despite the abundance of interstitial tissue, the uterus never enlarges. The most important fact is that the real growth and function of the uterus begin only at the time of puberty and are due to the growth and ripening of follicles with subsequent formation of corpora lutea. When this process ceases, the ovary shows a marked increase in connective tissue and atrophies. Likewise in the etiology of uterine hemorrhages the interstitial tissue plays no rôle. To be sure, there is a definite increase in interstitial cells in menorrhagia just as occurs before the menses, but there is a much greater development of interstitial tissue in pregnancy and also in radiated young amenorrhoeic women.

If the interstitial cells were responsible for the sex impulse the latter would be most marked in children.

That the interstitial cells have some function no one will deny. The interstitial cells are at first only a depot for the nourishment of the growing follicles and corpora lutea. Later they are a storehouse through which and from which absorption takes place; but the source of all that makes a woman what she is, is the intact follicle apparatus.

J. P. GREENHILL.

Goto, N.: Experimental Investigations of the Internal Secretion of the Ovary by Means of Rat Parabiosis. *Archiv für Gynäkologie*, 1924, cxxiii, 387.

The author conducted a series of interesting experiments with white mice by performing celotomies and then uniting the animals in pairs, after the method of

Sauerbruch and of Heyde. Of the 268 pairs of mice thus united, 78 lived for more than one month, one pair living 28 months. The fact has been previously established that a definite body fluid exchange takes place wherever such a parabiosis is accurately carried out and the animals survive.

By uniting male and male, male and female, and female and female, and at the same time castrating one of the animals thus united either partially or completely, the author was able to produce, in the other member of the parabiosis, a compensatory hypertrophy of the ovary or testis, depending on the sex of the second animal. In the case of the ovary, this consisted in excessive follicle formation, hyperdevelopment of the corpora lutea, and excessive cyst formation. The majority of the follicles matured and degenerated without ever reaching the surface or rupturing. To the substance, producing this change, Goto gives the name "castr hormone." This substance also produces a hypertrophy and hypersecretion of the uterine mucosa.

These same changes in the ovary and uterus were produced by injecting the serum of castrated rats, male as well as female, into the circulation of normal female rats, thus proving the presence of a "castr hormone" in the circulation of castrated rats. "Castr hormone" is never found in the normal rats because such changes in ovaries and uterus could not be produced by injecting the serum of normal rats into the circulation of healthy female rats.

RALPH A. REIS.

**Wintz: Experimental Research on the Inner Secretions of the Corpus Luteum and Placenta.** *Deutsche medizinische Wochenschrift*, 1924, 1, 67.

These experiments were carried out to determine whether extracts made from corpus luteum and placenta had the same physiologic effect. Water solutions were carefully prepared. Both preparations proved chemically the same. The injection of either preparation into guinea pigs caused enlargement of the uterus and genitals and flowing. In the puerperium, the secretion of milk was increased.

Both preparations have no effect on the pregnant uterus.

In human beings the corpus luteum extract increased the coagulation time of the blood while the placenta extract decreased it. The former increased the viscosity of the blood, the latter decreased it. Both caused hyperemia of the genitals. The corpus luteum substance brought on menstruation in cases of amenorrhea. This result was never obtained with the placenta. Both together increased the effect in amenorrhea, apparently a reinforcement of the corpus luteum substance by the other. The placenta substance had a specific effect in causing enlargement of the breasts. In the climacteric, corpus luteum substance was beneficial, placenta being less reliable. Placenta substance was beneficial in dysmenorrhea.

Other experiments were done on man using lipoids obtained from the corpus luteum and placenta. Both lipoids had the same chemical qualities. The corpus luteum lipoid decreased bleeding where it was of a functional nature, as in the bleeding of puberty, not suddenly but gradually. In myoma bleeding, however, the flow was increased. The placenta lipoid decreased the bleeding more rapidly and in both types of bleeding. The corpus luteum lipoid had no effect on the viscosity of the blood while the other decreased it slightly.

Preparations which seem to be identical chemically differ in their physiologic properties.

FRANK A. PEMBERTON.

**Papanicolaou, George: A Specific Inhibitory Hormone of the Corpus Luteum.** *Journal of American Medical Association*, 1926, lxxxvi, 1422.

The purified luteal extract was injected into guinea pigs who had previously been tested in regard to the regularity of their estrual cycle. Small quantities of from 1 to 2 c.c. cause a delay of the estrus (vaginal smear as biologic test). By giving weekly one injection, it is possible to suppress ovulation completely for a period of

from two to four months. Discontinuation of the injections was followed by ovulation after a few days. Similar extracts prepared from other parts of the ovary and from other organs all gave negative results. A larger dose of the extract causes a longer delay of ovulation. Inasmuch as the female sex hormone is also found in the corpus luteum it seems that both hormones are produced in the same organ. The proper luteal hormone and the female sex hormone act in an entirely different way and are, to a certain extent, antagonistic. The luteal hormone inhibits and delays ovulation, whereas the female sex hormone rather accelerates these processes. The luteal hormone does not cause hypertrophy in the genital tract of spayed females. Both hormones are active in pregnancy, one inhibits while the other stimulates, the two act simultaneously. Oral administration of extracts containing the luteal hormone yielded no results.

GROVER LIESE.

Frank, Gustavson, Holloway, Hyndman, Krueger, and White: The Occurrence and Present Chemical Status of the Female Sex Hormone. *Endocrinology*, 1926, x, 260.

The writers claim positive proof of the existence of a hormone in the corpus luteum and their work indicates that this hormone is identical with the hormone found in follicles and placenta. Placentas were used as a base for the late investigations, which involved a chemical study of two problems: (1) Is the physiologic activity of crude extracts due to the specific substances alone, or can these responses be brought about by other substances? (2) What is the chemical nature of these specific substances?

The work showed negative results with numerous other substances and positive results only with the specific substance. The active principle withstood saponification with alkalis for a long period of time without loss of activity. Female sex hormone is the term given to the substance, the active principle of which is a thermostable lipid of high molecular weight. It is elaborated by the gestational gland, taken up by the lymph and blood stream and selectively utilized only by Mueller's tract and the breasts.

WILLIAM KERWIN.

Enfenger, H., and Bader, C. W.: Lipoid Content of the Ovary during Pregnancy and Atresia of the Corpus Luteum of Menstruation during Pregnancy. *Archiv für Gynäkologie*, 1925, cxxiv, 483.

The authors examined the lipid content of thirty-four human ovaries removed from pregnant women and three removed during the early puerperium. The pregnancies ranged from four to forty weeks. Determinations were made by the dye method of Kawamura. They found a gradual decrease in the lipid content of the ovaries as pregnancy progresses, at term only the slightest traces remain. The same holds true for the graafian follicle in pregnancy, only slight traces of lipid being found. The majority of the lipoids are the esters of cholesterol and of cholesterol fatty acids. During the puerperium there is a rapid rise of lipid content of the corpus luteum of pregnancy and of the follicles. Unruptured corpora lutea of earlier menstrual periods are regularly found in the ovaries of pregnant women until the middle and occasionally even until the end of pregnancy. It would seem, therefore, that the unruptured corpora lutea possess a more important function than has hitherto been ascribed to them.

RALPH A. REIS.

Dignani, P. B., Onorato, F. P., and Piccardo, E. R.: Pathology of the Corpus Luteum. *Revista Espanola de Obstetricia y Ginecologia*, 1924, ix, 341.

The corpus luteum is an organ producing an internal secretion of the greatest importance to the female genital physiology. The interstitial gland of the ovary is of similar importance, as it is formed of the lutein cells of atretic follicles, and

therefore is closely allied to the corpus luteum. The corpus luteum controls ovulation and the relation between ovulation and menstruation; it controls the development of the fertilized ovum; it has a trophic action on the uterus; it controls the formation of the uterine decidua, and, in union with the fertilized ovum, brings about the formation of the placenta; in a later stage of development it inhibits ovulation; it influences mammary development and function. Finally, it is intimately associated with the rest of the endocrine system.

Menstruation is determined by internal secretion of ovary, especially that of corpus luteum and interstitial gland. Hyperfunction causes uterine hemorrhages, normal function gives rise to normal menstruation, and hypofunction to scanty flow or amenorrhea. The rôle of ovaries containing many atretic cysts in causing menorrhagias is therefore due to the overproduction of lutein cells and their secretions.

Hemorrhage from fibromyomata is probably not due to hyperfunction of the ovary alone, but results from a more complicated disturbance of endocrine balance. Hemorrhages of puberty are probably due to modifications of the corpus luteum.

Cysts of the corpus luteum are thought by some to be the cause of ectopic pregnancy by inhibiting the normal peristaltic action of the tubes. Cysts may rupture and cause intraperitoneal hemorrhage; sufficient cases have been reported to indicate that such rupture may occur without the presence of an ectopic pregnancy.

THOS. R. GOETHALS.

Pratt, J. P., and Allen, Edgar: *Clinical Tests of the Ovarian Follicular Hormone*.  
Journal of American Medical Association, 1926, lxxxvi, 1964.

Ovarian follicular hormone may be extracted from follicles, human corpus luteum or placenta. Its preparation has been described in previous papers of the writers. It has been sufficiently purified for injections into human beings without the slightest reaction. So far only the dosage of 1 c.c. fluid has been used. This dosage is rather small. There has been some difficulty to concentrate the hormone. The injection of this hormone into primates, monkeys and human beings from which the ovaries had been previously removed, produced growth of the uterus. The removal of ovarian follicular hormone by oophorectomy or the cessation of injections brought on menstruation in monkeys. Uterine growth and accompanying subjective symptoms similar to those experienced at time of menstruation have resulted from injections into patients whose ovaries had been removed previously. In cases of amenorrhea it has been impossible so far to restore the menstrual function.

GROVER LIESE.

Haneher and Rogers: *The Diagnosis and Treatment of Hypoovarianism*. *Endocrinology*, 1925, ix, 21.

Haneher and Rogers by oral administration and injections tested extracts from pig ovary to determine which gave the more uniform results. They concluded that a glycerin extract of the whole pig ovary was the most satisfactory. They found that after injecting a large amount of the extract intravenously in the dog, pituitrin appeared in the spinal fluid in fifteen or twenty minutes. When administered through a tube into the stomach of an anesthetized animal the pituitrin appeared more slowly but in large quantity. Follicular fluid, the corpus luteum, and the interstitial cells all give this reaction, but in extracts of the entire gland it seems most marked. They infer from this that ovarian feeding should stimulate the activity of the pituitary. In connection with this work one lobe of the thyroid was removed from a number of animals and five months later the other lobe removed when its iodine contents were found increased by 200 to 300 per cent. This would indicate a close relationship between the ovary and thyroid. By feeding a ten minim pill of the glycerin extract of the pig ovary three or four times daily to women

suffering from neuroses of the artificial or natural menopause very striking results were obtained, but in no case was the amenorrhea corrected. They conclude that a fresh glycerin extract of the entire fresh pig ovary is the best preparation for oral ovarian therapy.

WM. KERWIN.

Pallen, Conde de S.: Some Menstrual Disturbances and Their Treatment with the Opposing Principles of Corpus Luteum. *The Therapeutic Gazette*, 1925, xlix, 407-410.

Agomensin, a lipamin, from the immature corpus luteum, has a stimulating effect on the uterus. Sistomensin, a luteo-lipoid from the full-blown corpus luteum, has an inhibiting action.

In nineteen cases, agomensin has given results in: Menopause, with relief of their symptoms (seventeen cases). Oligomenorrhea beneficially treated (one case). No benefit in amenorrhea (one case).

Sistomensin results are: Good as a hemostatic in uterine bleeding (three cases), but has no effect in dysmenorrhea (two cases).

ADAIR AND HATHAWAY.

Vignes: The Ovarian and Uterine Cycle. *Journal de Médecine de Paris*, 1925, xliii, 895.

Vignes reviews the work which has been done on this subject both on women and on animals. He feels that altogether too much importance has been attached to the function of the corpus luteum, and that the true factor is the secretion of the ripening follicles, the corpus luteum merely carrying on their function temporarily after ovulation. The active element of the ovary should, therefore, be sought within the ovule.

THEO. W. ADAMS.

Crainicianu, Al.: Experimental Researches upon the Relations Between the Internal Secretion of the Ovary and the Tonus of the Vegetative System. *La Presse Médicale*, 1925, No. 8, p. 117.

The relation existing between the vegetative system and the glands of internal secretion are not as yet thoroughly understood. It may be that they constitute one neuroglandular system, closely bound together, or, on the other hand, the two systems may be independent but interrelated, but the studies of Pachon seem to indicate that the latter theory is probably the more tenable.

The functions of these glands have been studied in the lower animals by means of observations made after extirpation of the various glands, but in the human subject healthy organs of this system are practically never removed, except in the field of gynecology. Normal ovaries are often removed along with the uterus when hysterectomy is performed, and the author decided to study the tonus of the vegetative system in young women thus castrated. He employed the Danielopolu and Carniol method: the pulse of the patient is taken while reclining; intravenous injections of atropine are given until the vagus is completely paralyzed, and the pulse is again counted. The latter figure is the sympathetic tonus, the difference between the two, the vagal tonus. The point of complete paralysis of the vagus is determined as follows: ordinarily, the pulse on changing from the prone to the standing position will increase in rapidity, and will drop back to the first figure on reclining again. If the patient is insufficiently atropinized, the pulse will drop *below* the first figure on reclining the second time, but if the vagus is paralyzed this abnormal slowing does not occur, as the pulse falls *to*, but not *below*, the figure first obtained. This method is much more reliable than the oculo-cardiac reflex.

In a series of cases thus studied, the author found a constant lowering of the tone in both systems. These observations lead to the conclusion that the internal

secretion of the ovary, acting in concert with those of the other glands of internal secretion, maintains the tone of the vegetative system. Similar researches, carried out on patients operated upon for various other complaints (without removal of the ovaries), gave only negative results.

E. L. KING.

Sserdjukoff, M. G.: *Endocrine Forms of Epilepsy*. *Archiv für Gynäkologie*, 1925, cxxiv, 284.

The author describes a distinctive type of epilepsy which he feels is definitely due to disturbances of the endocrine glands, either singly or in groups. The etiology and pathogenicity of such an endocrine disturbance is found in connection with a certain specific constitutional status and with disturbances of the functions of the entire endocrine system, or at least in part. These groups which are most commonly affected include combinations of ovarian, thyroid, hypophyseal and uterine dysfunctions. The more severe types of such an endocrine epilepsy have a definite and rational surgical therapy as well as symptomatic or organotherapeutic forms of therapy.

RALPH A. REIS.

Dietrich: *A Forme Fruste of Dystrophia Adiposogenitalis and Its Experimental Basis*. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1924, lxxxvii, 146.

The author describes and illustrates with a number of cases a previously not differentiated endocrine disease syndrome which he designates as a *forme fruste* of *dystrophia adiposogenitalis*. He believes that this should be recognized as a separate entity on the basis of clinical findings, theoretical considerations, and the experimental proof of an hypophyseal disturbance in metabolism in the adrenalin blood-sugar curve. The disease occurs in small to medium-sized individuals who show a striking adiposity for their age. The history usually shows that the adiposity appeared in early youth and the fat deposits were localized to definite regions, hips, lower abdomen, nates, thighs, upper arms and breasts. Hands and feet, wrists and ankles are never affected. The menses usually appear late, there are periods of amenorrhea, often of years' duration and the bleeding is short, often lasting only for hours. Examination shows a more or less marked hypoplasia of external and internal genitalia. The labia majora and minora are poorly developed, the pubic hair scanty. The vagina is narrow, often short. The cervix is small, often conical. The uterus is usually well proportioned but small, often acutely anteverted, in some cases it is of the infantile type, particularly when the disturbances date back to childhood. The ovaries are small and frequently cannot be palpated, partially on account of the thickness of the abdominal wall.

The author considers the etiology a primary hypophyseal hypofunction with secondary hypoplasia of the genital organs and characteristic fat deposits. These are determined not by the ovarian but by the hypophyseal hypofunction. Preparations of the anterior lobe of the hypophysis are indicated therapeutically but there is no satisfactory preparation on the market. The author has obtained the best results with the pluriglandular preparations. Ovarian extracts are of no value whatsoever.

MARGARET SCHULZE.

Asehner, B.: *The Influence of the Hypophysis on the Female Genital Organs*. *Medizinische Klinik*, 1924, xx, 1681.

The hypophysis, like the pineal body, differs from the other glands of internal secretion because of its anatomic and apparently also functional connection with the brain. Contrary to the belief of Cushing and Biedl, extirpation of the anterior lobe of the hypophysis does not cause death. In dogs, complete removal of the anterior lobe or of the entire pituitary gland produces a cessation of growth and mental de-

velopment with the persistence of juvenile fat distribution, milk teeth and especially a persistent infantilism of the genitalia. Conception was never observed in dogs from whom the hypophysis was removed. In six normal pregnant dogs the hypophysis was removed and these animals aborted within three days. Milk appeared in the breasts and involution was very slow. It is a question whether removal of the hypophysis alone or whether in addition the unavoidable stimulation of the midbrain produced the abortion. Nevertheless the author believes that the vagus and sympathetic tracts in the floor of the third ventricle can initiate uterine contractions. In adult animals removal of the pituitary gland produced no noteworthy changes in the genitalia.

Asehner maintains that in the majority of cases of prolonged and painful labor it is not the bony pelvis which is at fault but the soft parts. He believes therefore that the proper therapy for long and painful labor is stimulation of pains by means of quinine and pituitrin and also by manual dilatation of the external os of the cervix if the latter is effaced.

It appears that hypophyseal disorders occur much more commonly in women than in men and that women in general have a much more labile system of glands of internal secretion. In acromegaly, pregnancy does not appear to be disturbed but toxemia occurs more frequently. Just as acromegaly is chiefly a disease of the female, so does hypophyseal gigantism essentially affect the male. Gigantism in the female is associated with sterility, hence nothing is known about pregnancy in such women. Likewise nothing is known of pregnancy in individuals with *dystrophia adiposa genitalis*.

In recent years roentgen ray treatment of the hypophysis and the midbrain has been employed for hypophyseal disorders, also for hemorrhages from the genitalia and for symptoms of the menopause. Asehner however warns that such therapy is dangerous and should be used as a last resort only.

J. P. GREENHILL.

Borchardt, L.: Thyreo-Sexual Insufficiency. *Monatsschrift für Geburtshilfe und Gynäkologie*, 1923, lxiv, 253.

The thyroid among all the glands of internal secretion is conspicuous because of its close relationship to the sex glands. With every physiologic change in the sex glands at the critical periods of life, changes are observed in the thyroid. At puberty the thyroid often enlarges, in some cases to form even a puberty struma. More rarely there occurs a puberty atrophy of the thyroid. Many women exhibit a premenstrual swelling of the thyroid, but most characteristic and most constant is the hyperplasia of the thyroid during pregnancy. After castration and at the beginning of the climacterium the thyroid often enlarges.

On the other hand, diminished function of the thyroid leads regularly to lack of development of the sex glands. In congenital and infantile myxedema as well as in endemic cretinism, there is absence of development of the gonads and of the secondary sex characters. Animal experiments show that thyroidectomy in young animals leads to hypoplasia of the sex glands and in adult animals to atrophy of the sex glands. These conditions can be remedied by thyroid therapy.

The simultaneous appearance of hypofunction of the thyroid and sex glands is called thyreo-sexual insufficiency. There are four distinct types, namely, puberty, puerperal, climacteric and the hypothyroid type.

The symptoms vary from the relatively infrequent myxedematous type to the very benign forms with mild symptoms, such as headache, obstipation, obesity, alopecia, skin eruptions, etc. It is not uncommon to find women who become obese and complain of oligo- or amenorrhea after their first labor. At the menopause we find symptoms of so-called benign hypothyroidism, such as headaches, neuralgia, alopecia, obstipation, rheumatism, obesity, arteriosclerosis, etc., all of which in many cases are curable by thyroid therapy.

Only in childhood does hypothyroidism inevitably lead to insufficiency of the sex glands. In adult life, however, we see cases of hypothyroidism without hypofunction of the gonads. The cases of pure hypothyroidism are less frequent than those of thyreo-sexual insufficiency. On the other hand, not all cases of hypogenitalism show signs of hypothyroidism but such occurrences are rare among women.

The course of thyreo-sexual insufficiency is usually benign. The mild cases are cured spontaneously, more outspoken cases require thyroid therapy.

J. P. GREENHILL.

Knaus, H. H.: The Action of Pituitary Extract Administered by the Alimentary Canal. *The British Medical Journal*, 1926, i, 234.

When pituitary extract is administered at any part of the alimentary canal, mouth, stomach, small intestine or rectum, pressor action is never observed. When pituitary extract is introduced into the stomach or small intestine it exerts no influence on the uterine muscle. When administered by the mouth, after a latent period of about eight minutes, it exerts a marked action on the uterus, increasing both the tone and automatic movements. The oxytocic substance is therefore absorbed. The rectum also absorbs the oxytocic substance though probably not so completely.

ADAIR AND PROSHIK.

Pighini, Giacomo: The Action of Thyroid Extract upon the Fetus and Pregnant Uterus. *Polielinico (Sezione Medica)*, 1925, xxxii, 334.

Pighini studied the action of thyroid extract upon the sex glands and the products of conception, and showed that administration of the extract to a pregnant animal results in the death of the fetus and abortion. He used a solution containing one gram of the thyroid extract of the ox in 5 c.c. of physiologic saline solution. Subcutaneous injections in amounts varying from 2 to 4 c.c. are sufficient to produce in rabbits and dogs death of the fetus and abortion in practically every case. In dogs, injected with the extract during heat and becoming pregnant very shortly afterward, abortion occurred in 40 to 45 days. In rabbits the same treatment produced abortion in 25 to 25 days after fecundation.

Further investigations showed: In the adrenal gland these injections lead to a hyperproduction of adrenalin in the cortex but a hypoproduction in the medullary portion. In the cortex there is evident a scarcity of cholesterol and of phosphates. In the ovary is seen a great decrease in the cholesterol lipoids, a less rapid maturation of the germ cells and a degenerative involution of the germinative elements (linea ovuli). The cholesterol phosphates of the blood are augmented. Pighini believes that the variation in the secretion of adrenalin and the lipid changes in the ovaries are responsible for the death of the fetus and abortion. J. M. PIERCE.

Fekete, A.: The Disturbances of Menstruation and the Influence of Organ Extracts upon Them. *Monatsschrift für Geburtshilfe und Gynäkologie*, 1923, lxiv, 267.

During the last decade it has been recognized that the ovaries give only the impulse which produces the menstrual changes in the uterine endometrium, while the bleeding itself as well as the clinical symptoms associated with the bleeding are independent of the ovaries and are due to constitutional, nervous and uterine factors. Schroeder's classification of uterine bleeding is as follows: (1) amenorrhea, the absence of menstruation in adult life; (2) oligomenorrhea, menstrual periods five or more weeks apart; (3) polymenorrhea, menstrual periods less than three weeks apart; (4) hypomenorrhea, scanty flow; (5) hypermenorrhea, profuse flow at the periods; (6) dysmenorrhea, pain or general discomfort at the periods; (7) metrorrhagia, bleeding at irregular intervals.



From experiments and clinical observations the author concludes that the disturbances in menstruation are not in every instance referable to the internal secretory disturbance of the ovaries. On the other hand, disturbances are frequently found in other organ systems, such as the nervous system and other glands of internal secretion, which while not directly in causal relationship with the disturbances of bleeding, are the stimulating factors. This is particularly true of the vasomotor system and explains the increased or diminished flow of blood as well as dysmenorrhea. Only where these factors do not appear to be active and where other signs (constitutional) speak for it, should we assume the ovaries are at fault. In such cases we find evidence of hypofunction of the ovaries as shown by a general infantile habitus, hypoplasia of the genitalia and only moderately developed secondary sex characters.

A large part of the menstrual disturbances are amenable to the injection of organ extracts. This is not to be attributed to a specific action but to a general action. Just as good results are obtained with injections of concentrated Ringer's solution.

J. P. GREENHILL.

Landecker, A.: The Significance of Combined Organotherapy and Ultraviolet Radiation for the Functional Disturbances of the Female Genitalia. *Medizinische Klinik*, 1925, xxi, 740.

The combined use of organotherapy and ultraviolet ray treatment has been found very useful in the treatment of genital hypoplasia and hypofunction both of the congenital and acquired types. This treatment consists in using ultraviolet rays through the vagina and the abdominal wall to produce crossfire radiation of the ovaries; and in addition, uterine, placental and hypophyseal (anterior lobe) preparations. This method is far safer and just as effective as x-ray therapy, of which the dosage cannot always be regulated. Animal and plant experiments have proved the value of ultraviolet rays for the maintenance, rejuvenation and growth of organic life.

J. P. GREENHILL.

Allen, Edgar, and Ellis, M. M.: The Effect of Ultraviolet Rays on the Hormones of the Ovarian Follicle and Placenta. *Journal of the American Medical Association*, 1925, lxxxv, 94.

The experiments show that exposure to the ultraviolet rays destroys both the ovarian and the placental hormone and further, that the action is on the hormones rather than on the oil used as a solvent. Most probably this destruction is caused by oxidative changes, as it is well known that ultraviolet rays promote oxidation of some substances.

GROVER LIESE.

Küstner, H.: The Internal Secretory Changes After Extirpation of the Uterus. Operative Castration, Roentgen Ray Castration, and the Normal Climaeterium. *Monatsschrift für Geburtshilfe und Gynäkologie*, 1925, lxx, 284.

The author found that x-ray and operative castration always produced severe symptoms, such as heat sensations, chills, palpitation of the heart and headache, whereas women in whom hysterectomy had been performed felt well after operation. The subjective castration symptoms disappeared after one or one and one-half years in most patients. If symptoms appear after hysterectomy they are usually due to changes in the circulation.

The Lüttge-Mertz reaction enables us to test the function of every gland of internal secretion. A positive reaction indicates a pathologic condition. Küstner studied the serum of women who were having a normal climaeterium, patients who had their uterus removed, patients who had both uterus and ovaries extirpated, and patients who were castrated by means of the x-ray. The serum of patients who were having a normal climaeterium and the patients in whom the uterus or the uterus and ovaries

were removed gave no reaction with ovarian substance. However, serum of patients who had been subjected to the roentgen ray gave a positive reaction. His explanation is as follows: When the ovaries cease to function normally, no change is found in the serum. If the uterus alone is removed the ovaries function normally. When both ovaries are removed, no reaction is obtained because there is no internal secretion of the ovaries. However, when a patient is treated with x-ray a definite change takes place. The follicle apparatus is destroyed completely but a change in the internal secretion of the ovaries is produced. This change has not been detected histologically up to the present time. There may be a connection between x-ray treatment and subsequent formation of carcinoma of the ovary. The author concludes that the use of x-ray to produce castration causes not only a cessation of the normal function but it also substitutes a diseased function. For this reason hysterectomy is preferable to the x-ray where operation is not contraindicated.

J. P. GREENHILL.

Tuffier, Th., and Bour, D.: *Ovarian Grafts. Experimental and Clinical Results Concerning Menstruation, Fecundation and Pregnancy.* Presse Médicale, 1925, xxxiii, 1073.

This article constitutes an excellent review of the subject of ovarian grafting. Particular attention is given to the operation of grafting the ovary into the cavity of the uterus, with its pedicle preserved intact.

From a study of the literature, as well as from their own rich experience, the authors draw the following conclusions:

(1) Free grafts, grafts of ovarian tissue without preservation of the blood and nerve supply, especially if autografts, are usually followed in from three to five months by the reestablishment of menstruation, which generally persists for from five to ten years. If the graft is in the uterus, pregnancy may supervene, as has been proved by animal experimentation as well as by clinical experience in the human. Twenty-four such operations in women have been reported, with six known uterine pregnancies and one probable ectopic pregnancy. Free homeografts (ovarian tissue from another woman), while generally of no avail, have been followed by pregnancy twice (cases of R. T. Morris).

(2) The transplantation of the ovary with intact vascular and nervous pedicle into the uterus is a logical and useful operation in properly selected cases. The nutrition of the ovary is provided for, ovulation occurs, and the ovule is discharged into the uterus, hence fecundation and nidation are possible. Menstruation is not as a rule disturbed either in its rhythm or duration, and the discomforts of the surgical menopause are avoided. The only disadvantage is that 50 per cent of the patients complain of slight premenstrual pain. Of the forty-nine operations of this type reported, forty-one were followed up. Eighteen menstruated within one month after operation, nine within two months, five within three months, two did not menstruate at all, and the others began to menstruate at intervals varying from three months to one year after operation. Three patients were subjected to hysterectomy subsequently, two for constant pain, one for intestinal obstruction from adhesions (but not to the site of the incision made when the ovary was transplanted). No pregnancies have resulted in these forty-one patients, but many of the women were of the type who are not desirous of pregnancy.

E. L. KING.

Bell, W. Blair: *Ovarian Grafting.* Surgery, Gynecology and Obstetrics, 1925, xli, 706.

The question of the employment of ovarian grafting in preference to the so-called "clean sweep" is no longer open to discussion. Ovarian transplantation is a procedure no scientific gynecologic surgeon can afford to neglect.

When the surgeon has decided that it is impossible safely to conserve any ovarian tissue in the normal position, the next consideration arises in regard to the best method of transplantation. It is generally conceded that to secure a functional result the procedure should always be autoplasmic. Homoplastic grafting with ovarian tissue from another woman is very rarely effectual; and heteroplastic ovarian implantation with tissue from another animal is useless.

The ovarian tissue removed, is separated from other structures, such as the tube, and a long silk thread on a sharp needle is passed through it. The two ends of the thread are knotted together, and the ovary so tethered is placed in the pouch of Douglas, or elsewhere in the peritoneal cavity, the ends of the thread being brought through the laparotomy opening and held in a pair of forceps. In this way the ovarian tissue is kept moist and warm in natural surroundings until required for grafting. When the operation for the primary lesion has been completed, but before the laparotomy wound is closed, the ovary is recovered by withdrawing the thread attached to it and is placed on a sterilized square of rubber, six inches in diameter. A very sharp grafting knife is taken, and the hard cortex is shaved off the ovary or pieces of ovary as the case may be. Then by a series of crisscross incisions the whole piece of ovary is divided into small parts which are still held together by the underlying layer of tissue. The exposure of such a large area of surface and the limited size of the fragments tend to insure rapid vascularization of the implanted tissue. There is also less chance of follicular cyst formation.

An opening is made into the sheath of the rectus muscle and closed blunt pointed forceps are pressed into the body of the rectus muscle. The blades are then slowly opened parallel to the surface. It is most important that there be no bleeding for although grafts must be implanted in vascular areas, if the grafted tissue is bathed in blood it cannot become attached to the surrounding structures from which nutrient is to be drawn. The ovarian graft is now passed into the middle of the muscle and laid flat among the fibers. The edges of the rectus sheath are brought together with a couple of sutures and the laparotomy wound is closed.

After histories on only 70 per cent of cases subjected to ovarian grafting were obtained, the total number of cases recorded were 187.

After the ovaries have been completely removed from the normal position, and even though ovarian tissue has been transplanted there is a period between the operation and the time when the graft has become completely vascularized and is supplying internal secretion to the host during which the patient may suffer with all the physical and psychic disturbances of the menopause. The duration varies from one to eight months after operation, and as soon as the transplanted tissue becomes fully functional these disturbing symptoms disappear, often coincidentally with the reappearance of menstruation, if that is possible.

Menstruation when it appears may be quite regular for many years. A number of the patients are still menstruating normally and regularly seven years after operation.

WM. C. HENSKE.

Rouffart-Thiriar: Transplantation of the Ovaries into the Uterus. Bruxelles-Medical, 1926, x, 316.

Of late there has been a tendency toward less radical treatment than complete castration in bilateral adnexal inflammation. Along this line the author discusses the procedures of Estes and Tuffier. Both of these workers transplanted one ovary into the uterus, the operative technic varying slightly.

Estes who did the operation one hundred times has followed up the results in twenty-seven cases. In four the menstrual periods were slightly accentuated, while in one case they continued normally. Three cases had to be reoperated because of pain due to cystic degeneration of the ovary. Seven cases complained of slight pain

in the side. Ten were somewhat "nervous" and presented symptoms of hyperthyroidism. Four cases subsequently became pregnant, two aborting, while in the other two instances the children were carried to term.

Tuffier's results were equally as satisfactory.

One case operated on by Tuffier's technic died nine months later following an operation for acute intestinal obstruction. The pelvic organs were then obtained for careful study. Microscopic examination showed that recent ovulation had occurred in the transplanted ovary, the ova having been discharged into the uterine cavity. Aside from slight fibroid atrophy the ovary was perfectly adapted to its new environment.

THEODORE W. ADAMS.

Sserdukoff, M. G.: *Intra-Uterine Transplantation of the Ovaries*. *Gynécologie et Obstétrique*, 1926, xiii, 164.

This procedure was first carried out by Palmer-Dudley in 1899. He operated on nine women and established the principle of preserving the entire ovarian circulation. To this end he found transplantation in the tubal cornua more satisfactory than in the posterior wall. In 1907, Lissianski, operating on dogs, obtained histologic confirmation of the normal growth of ovarian tissue in the wall of the uterus (follicles, corpus luteum, etc.). Storer, in 1915, first obtained a pregnancy by this operation. The large volume of work done since this time has been reviewed by Hartmann who states that this procedure creates conditions favoring gestation, which may be expected to persist. He places the incidence of an early pregnancy following this operation at 10 per cent.

The chief value of the operation is in the cure of sterility due to occlusion of the tubes. The chance of a pregnancy is increased not alone by the probability of the delivery of ova into the uterine cavity, but also by the improved hormone balance due to the freeing of the ovary which is generally involved by the process causing the occlusion. One of the author's cases had an absolute, and the other a relative occlusion of the tubes, as determined by insufflation. In these cases an ovary was freed, and transplanted in the region of the excised isthmie portion of the tube. The author points out that it is important to conserve at least one of the vascular pedicles of the ovary. It is not necessary, as formerly believed, to cover the abdominal end of the transplanted ovary with peritoneum. Trauma, (the use of too many sutures, etc.) is to be avoided. It is too early to report results in these cases.

GOODRICH C. SCHAUFFLER.

Sippel, Paul: *The Homeoplastic Transplantation of Ovaries in Schizophrenia*. *Klinische Wochenschrift*, 1925, iv, 401.

After the satisfactory results obtained by homeoplastic transplantation of ovaries in primary and secondary hypogenitalism, the author has enlarged the field of transplantation to schizophrenia, and possibly to climacteric psychoses.

In schizophrenia (dementia precox) he found a considerable percentage of patients to have a more or less pronounced hypoplasia and underfunction of the genital system. In a series of 176 cases of dementia precox, Fraenkel had ascertained 72 per cent of marked infantile changes in the genitals. Geller agreed with Mott, Fraenkel, Hauck, and Koehler, that there is a close relationship between subnormal genital function and dementia precox.

On the basis of these findings he has to date transplanted ovaries to 6 young women with dementia precox. A close control of their psychiatric condition was possible as these cases were kept in the Hospital for Mental Diseases at Dalldorf.

The operated cases were schizophrenics of ages between eighteen and twenty-four. The status of their genital systems was definitely ascertained by means of diagnostic curettage and laparotomy, and showed mild, medium, and severe grades of hypo-

plasia. In five cases the uterine mucous membrane was entirely functionless. In three cases there was a mature ovum in the ovary and no corpus luteum formation. In two cases an old corpus luteum in advanced retrogression was found, which did not fit in with the stated menstrual period. In practically all cases there was pronounced disturbance of maturation of the ovum associated with a functional disturbance of the uterine mucous membrane due to hypoplasia of that organ.

Two girls, showing schizophrenia with a slight grade of hypogonitalism, showed progressive improvement two to four weeks after transplantation. Their hallucinations, negativism and depressive symptoms disappeared almost entirely, their periods were more normal, the patients took on a healthy appearance and were discharged, as improved, two months after transplantation.

In one case, age nineteen, schizophrenia of two years duration and marked underdevelopment of the genital system, the psychiatric condition was unchanged after operation.

The author concludes, that by means of homeoplastic transplantation of ovaries, good results were obtained in three early cases of schizophrenia, which showed a light grade of hypogonitalism.

ADAIR AND SAFFERT.

Sippel, P.: Treatment of Profuse Hemorrhage by the Transplantation of Ovarian Tissue. *Zentralblatt für Gynäkologie*, 1926, 1, 99.

Profuse genital hemorrhage in puberty and later in life is frequently due to a hypofunction of the ovaries. Persistence and cystic degeneration of the follicle, as well as a complete lack of a corpus luteum, are the most common pathologic findings in such cases. Twenty cases of this type, which had all been treated unsuccessfully by other methods, were subjected to curettage and laparotomy for the correction of malpositions and removal of gross pathologic changes. Several pieces of normal ovarian tissue were finally transplanted into the muscles of the abdominal wall. The results of the procedure were most satisfactory. These patients menstruated regularly and the flow was of normal duration. During one of the next regular menstruations all patients were eutretted once more, in order to compare the microscopic picture of the endometrium with the one seen at the time of the profuse bleeding. Most cases at second curettage showed an endometrium of good functional activity containing an abundance of glycogen.

GROVER LIESE.

Mansfield: Replacing and Regulating Ovarian Function. *Zentralblatt für Gynäkologie*, 1925, xlix, 537.

Starting from the assumption that in the absence of the uterus the ovarian function fails very rapidly he undertook autoplasmic transplantation of the ovary in fifty cases and concludes that this procedure gave good results without exception in all cases of the removal of the appendages where the uterus was conserved. When the uterus was removed (radical operation), only one-half the cases were benefited by the transplant.

Better results were obtained where it was possible to conserve one ovary, as the transplantation seemed to delay the ordinary effect of the removal of the uterus on the remaining ovary. Sexual excitability was increased more often and more markedly when the uterus was removed than when it was allowed to remain. The autotransplantation introduced the same conditions regarding ovulation of the remaining ovary as after a homeoplastic, and may be considered a substitute for this procedure.

Unilateral radiation is a satisfactory remedy for excessive menstruation due to hyperfunction of the ovaries. Dysmenorrhea too is favorably influenced where hyperfunction leads to sexual aberration. Operative reduction of the ovary gives satisfactory results.

LITTLE.

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### THE BACTERIAL CONTENT OF THE UTERUS AT CESAREAN SECTION

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IT IS becoming recognized that the mortality following cesarean section is much greater than is generally believed and, in some instances, is appalling. This has been emphasized by many writers, among whom may be mentioned: Williams,<sup>1</sup> Newell,<sup>2</sup> DeNormandie,<sup>3</sup> and Holland,<sup>4</sup> as well as in the 1923 Report of the Committee on Maternal and Infant Welfare of the Massachusetts State Medical Society.<sup>5</sup> Certain of these reports show that the excessive maternal mortality is due, in great part at least, to the fact that it is not generally recognized that the danger of the operation increases progressively with every hour elapsing after the onset of labor, and is explained by finding that an ascending infection of the uterus occurs whenever labor has progressed for some time. Williams,<sup>6</sup> in 1917, first adduced histologic evidence concerning the occurrence of such infections, which was still further confirmed when one of us (J.W.H.<sup>7</sup>) demonstrated its existence in twenty-two of thirty-three uteri removed by supravaginal hysterectomy following cesarean section when labor had lasted for six or more hours.

Walthard,<sup>8</sup> in 1919, reported that positive cultures were obtained from the amniotic fluid and uterine secretion at fifteen cesarean sections. He failed to state how long the patients had been in labor when the operation was done, but most of them had been in the hands of midwives or physicians before admission to the clinic and in all of them five to eighty hours had elapsed between the rupture of the membranes and the time of operation. His report fails to give the exact method employed in taking the culture, nor does he state the number

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of sterile cultures obtained. When anaerobic cultures were made the deep agar shake technic was employed, and from his tables it appears that in only a single instance did the bacteria present in the anaerobic cultures fail to grow when incubated aerobically. Moreover, in seven of the fifteen patients the incisions healed imperfectly and from them he obtained bacteria which were identical with those originally obtained from the uterus. Such findings, he believed, indicated that infection of the incision had resulted from bacteria originating within the uterus and not from the exterior.

It seemed to us that a thorough bacteriologic study of the contents of the uterus obtained at cesarean section performed at varying stages of labor would be of value, more particularly if we could show how long labor can last without invasion of the uterus by bacteria, as well as the types of organisms which may be present when such invasion occurs. Furthermore, it seemed that such a study might give valuable information concerning the advantages and disadvantages of the several types of cesarean section in common use. We have, therefore, made such studies in fifty cesarean sections and in this paper we shall present the clinical aspects of our investigation, reserving for another the publication of the more technical bacteriologic details.

#### DESCRIPTION OF METHODS

All of the cultures were taken through the uterine incision, in order to insure that they could not be contaminated by the vaginal secretion. As soon as the child was delivered, and before the hands or instruments had been introduced into the lower uterine segment, a sterile, cotton-covered swab was passed through the uterine incision and rubbed over the lower uterine segment, care being taken that it did not come in contact with any portion of the uterus except that from which the culture was desired. As soon as possible smears were made from the swab, after which it was inoculated into the following media: anaerobic and aerobic human blood agar plates, anaerobic and aerobic dextrose acid agar plates, cooked meat sealed with vaseline, anaerobic and aerobic human serum bouillon, and aerobic lactose fermented bouillon containing bromocresol purple as an indicator. The anaerobic plates and bouillon were incubated in the anaerobe jar devised by one of us (J. H. B.<sup>9</sup>). It should be stated that in no instance were bacteria found in the primary smears which we were unable to grow in culture and identify.

#### CLASSIFICATION OF OPERATIONS

Since the type of cesarean section done in this clinic is largely determined according as the patient is operated upon before the onset of labor or a varying length of time afterwards, a convenient method of analyzing our results is to divide our cases into three groups according to the type of operation performed. When this is done it is seen that thirty-one were delivered by the classical, conservative operation, thirteen by the low cervical technic, and six by the radical procedure (supravaginal hysterectomy).

*Classical Cesarean Sections.*—Table I gives the data concerning the thirty-one patients who were delivered by classical, conservative cesarean section. For information concerning the exact details of this operation as performed in this clinic, the reader is referred to Dr. Williams' textbook.<sup>10</sup> Table I shows that the thirty-one operations were performed at the following times in relation to the onset of labor:

(a) Before onset	19
(b) Doubtful onset	1
(c) Less than six hours after onset	6
(d) Six or more hours after onset	5
	<hr/> 31

In all these patients the temperature at the time of operation was normal. The cultures were sterile in twenty-five of the twenty-six

TABLE I  
CLASSICAL CESAREAN SECTIONS

CASE NO.	DURATION OF LABOR	VAGINAL EXAMINATIONS	RUPTURE OF MEMBRANES	DILATATION OF CERVIX	PUERPERIUM	HEALING OF INCISION	UTERINE CULTURE
VI	0	0	Intact	Closed	Febrile	Excellent	Sterile
VIII	0	0	Intact	Closed	Afebrile	Excellent	Sterile
XIX	0	0	Intact	Closed	Afebrile	Excellent	Sterile
XX	0	0	Intact	Closed	Afebrile	Excellent	Sterile
XXII	0	0	Intact	Closed	Afebrile	Excellent	Sterile
XXIII	0	0	Intact	Closed	Febrile	Excellent	Sterile
XXVI	0	0	Intact	Closed	Afebrile	Excellent	Sterile
XXXII	0	0	Intact	Closed	Febrile	Excellent	Sterile
XXXIII	0	0	Intact	Closed	Febrile	Excellent	Sterile
XXXIX	0	0	Intact	Closed	Febrile	Excellent	Sterile
XL	0	0	Intact	Closed	Afebrile	Excellent	Sterile
XLII	0	0	Intact	Closed	Afebrile	Excellent	Sterile
XLVII	0	0	Intact	Closed	Febrile	Excellent	Sterile
LIII	0	0	Intact	Closed	Febrile	Excellent	Sterile
LV	0	0	Intact	Closed	Febrile	Excellent	Sterile
LVI	0	0	Intact	Closed	Afebrile	Excellent	Sterile
LVII	0	0	Intact	Closed	Febrile	Excellent	Sterile
LVIII	0	0	Intact	Closed	Febrile	Excellent	Sterile
XXX	0	0	10 hr.	Closed	Febrile	Excellent	Staph. albus
LIX	Labor doubtful	0	Intact	Closed	Febrile	Excellent	Sterile
XII	2 hr.	0	Intact	2 cm.	Afebrile	Excellent	Sterile
XIII	2 hr.	1	Intact	1 cm.	Afebrile	Excellent	Sterile
XVII	3 hr.	3	Intact	3 cm.	Febrile	Excellent	Sterile
XXXI	3 hr.	0	10 hr.	Closed	Afebrile	Excellent	Sterile
XLV	4 hr.	0	Intact	3 cm.	Febrile	Excellent	Sterile
LX	4 hr.	0	Intact	Closed	Febrile	Excellent	Sterile
XIV	6 hr.	0	Intact	2 cm.	Febrile	Excellent	Aerobic diphtheroid
XLIX	6 hr.	0	Intact	4 cm.	Febrile	Poor	Anaerobic, hem. strep.
XXXVI	12 hr.	0	Intact	Closed	Febrile	Excellent	Aerobic diphtheroid
LIV	13 hr.	0	Intact	4 cm.	Febrile	Excellent	Anaerobic, nonhem. strep.
XXXIV	19 hr.	2	4 hr.	4 cm.	Febrile	Poor	Anaerobic, nonhem. strep.



uteri included in the first three groups, while in the remaining positive case the membranes had ruptured ten hours before operation and *Staphylococcus albus* only was isolated. In the twenty-six patients included in the first three groups, the wound healed per primam. In eleven of them the puerperium was afebrile, while in fifteen the post-partum temperature exceeded 100.4° F. Of the five patients in group (d), two had infected incisions and in all of them the puerperium was febrile. That the intact membranes are not an effective barrier to the entrance of bacteria into the lower uterine segment is shown by the fact that in four of these five patients the membranes were intact at the time of operation, and in two instances the invading organism was the streptococcus.

*Low Cervical Cesarean Sections.*—Thirteen of the fifty patients were delivered by low cervical cesarean section. The technical details of this operation as performed in this clinic are essentially those advocated by DeLee.<sup>11</sup> Table II shows that none of these patients were operated upon at an appointed time at the end of pregnancy, only three within twelve hours after the onset of labor, and ten from twelve to fifty-four hours afterwards. Sterile cultures were obtained from two patients, while bacteria were present in eleven. One sterile culture was obtained from a patient who was doubtfully in labor while, in the other, labor had lasted two hours when the operation was done. On the other hand, all of the eleven patients from whom positive cultures were obtained had been in labor from eleven to fifty-five hours before operation. In the two patients with sterile cultures the puerperium was normal in one and febrile in the other, whereas in the eleven infected patients only two presented afebrile puerperia. The incisions in both the patients with sterile cultures healed by primary union as in two of the eleven patients with infected uteri. However, in the remaining nine patients with positive cultures the incision was infected. Again attention should be called to the fact that positive cultures were obtained in two cases in which the membranes were intact at the time of operation, the streptococcus, together with other organisms, being isolated in both instances. That a normal temperature at the time of operation does not insure the absence of ascending infection is shown by the fact that in six of the eleven cases the temperature was normal when the operation was begun, while in only two was it more than 100° F.

*Radical Cesarean Sections.*—Six of the fifty patients included in this study were delivered by cesarean section followed by supravaginal hysterectomy. The data concerning them are to be found in Table III. The series is too small to permit definite conclusions but it is interesting to note that the only sterile culture was obtained in a patient who was doubtfully in labor and where the uterus was removed solely to effect

TABLE II  
LOW CERVICAL CESAREAN SECTIONS

CASE NO.	DURATION OF LABOR	VAGINAL EXAMINATION	RUPTURE OF MEMBRANES	DILATATION OF CERVIX	TEMP. AT OPERATION	PUERPERIUM	HEALING OF INCISION	UTERINE CULTURE
XVIII	Labour doubtful	0	Intact	Closed	Normal	Afebrile	Excellent	Sterile.
XXVII	2 hr.	1	2 hr.	3 cm.	Normal	Febrile	Excellent	Sterile.
LII	11 hr.	Many	11 hr.	10 cm.	100.0	Febrile	Poor	Aerobic, hem. strep. Staph. albus.
XXV	12 hr.	Many	12 hr.	3 cm.	Normal	Febrile	Poor	Aerobic diphtheroid. Anaerobic, hem. strep. Anaerobic, non-hem. strep. Staph. albus. Aerobic diphtheroid.
VII	16 hr.	0	Intact	2 cm.	Normal	Febrile	Stitch abscesses	Anaerobic, nonhem. strep. Anaerobic diphtheroid.
XXXV	24 hr.	0	60 hr.	2 cm.	Normal	Febrile	Poor	B. pseudonecrophorus.
XXXVII	27 hr.	0	16 hr.	3 cm.	Normal	Afebrile	Excellent	Aerobic, hem. strep. Anaerobic nonhem. strep. Döderlein's bacillus. Yeasts.
LII	28 hr.	0	Intact	3 cm.	Normal	Febrile	Poor	Anaerobic, nonhem. strep. Staph. albus.
XI	28 hr.	Many	28 hr.	10 cm.	Normal	Febrile	Poor	Aerobic, nonhem. strep. Staph. albus.
XXXVIII	40 hr.	0	3 hr.	10 cm.	100.6	Afebrile	Excellent	Aerobic, diphtheroid. pseudonecrophorus.
XLIV	41 hr.	2	41 hr.	3 cm.	101.0	Febrile	Poor	Anaerobic, nonhem. strep. B. pseudonecrophorus. B. welchii.
XLVI	43 hr.	2	10 hr.	3 cm.	99.0	Febrile	Poor	Aerobic, hem. strep. Aerobic, nonhem. strep. Staph. albus. Staph. aureus.
XLVIII	55 hr.	1	55 hr.	4 cm.	99.4	Febrile	Poor	Aerobic diphtheroid. Anaerobic, hem. strep. Anaerobic, non-hem. strep. Staph. albus. Aerobic diphtheroid. B. welchii.

TABLE III  
RADICAL CESAREAN SECTIONS

CASE NO.	DURATION OF LABOR	VAGINAL EXAMINATIONS	RUPTURE OF MEMBRANES	DILATATION OF CERVIX	TEMP. AT OPERATION	INDICATION FOR REMOVAL OF UTERUS	PUERPERIUM	HEALING OF INCISION	UTERINE CULTURE
IX	Labor doubtful	0	Intact	Closed	Normal	Sterilization	Febrile	Excellent	Sterile
XLI	10 hr.	0	Intact	4 cm.	Normal	Sterilization	Febrile	Excellent	Yeasts
L	10 hr.	Many	5 hr.	10 cm.	Normal	Tetanic uterus	Febrile	Excellent	Staph. albus. Aerobic diphtheroid
XLIII	17 hr.	0	17 hr.	2 cm.	101.0	Attempted version Infection	Febrile	Excellent	Staph. albus. Aerobic diphtheroid
XXVIII	24 hr.	0	48 hr.	2 cm.	102.0	Cyst blocking pelvis Infection	Febrile	Excellent	Staph. albus. Aerobic diphtheroid
XXIX	24 hr.	4	24 hr.	1 cm.	100.4	Cervical atresia Infection	Febrile	Excellent	Anaerobic, nonhem. strep. Aerobic, nonhem. strep. Staph. aureus.

sterilization. While all six of these patients had febrile puerperia, all of the incisions healed by primary union and none of the patients were considered particularly ill. This is in accord with our experience with the radical operation, as we have observed that, even when done late in labor, it is generally followed by prompter recovery with fewer complications than the elective classical section.

#### DISCUSSION

It is generally admitted that the pregnant uterus is sterile up to the onset of labor. It has been shown by histologic and bacteriologic investigations, as well as by clinical experience, that the uterus which has been subjected to prolonged labor and, more particularly, to intrauterine manipulation, is frequently infected. The questions of special interest are, when does bacterial invasion occur and what factors control it. The factors which are generally considered to determine the presence or absence of bacteria in the uterus during labor are vaginal examinations, the time of rupture of the membranes, and the duration of labor. Moreover, it seems to be a widespread opinion that bacterial invasion of the uterus during labor promptly makes itself manifest by elevation of the temperature. We think that this series of cases may be studied profitably with these various factors in mind.

Without doubt vaginal examinations during labor, even when done with the strictest aseptic technique, definitely increase the likelihood of infection. It is probable that as soon as the routine rectal examination during labor, as a substitute for vaginal examination, comes into wider usage, this fact will receive increasing confirmation. However, the absence of vaginal examinations during labor by no means insures that the uterus is free of bacteria. This is shown by a study of our tables. In the series of fifty patients positive cultures were obtained from the lower uterine segment in twenty-two, and in thirteen of them no vaginal examinations had been made during labor. For this reason it seems permissible to conclude that the absence of vaginal examinations during labor does not necessarily insure freedom from bacterial invasion.

It is generally believed that premature rupture of the membranes adds materially to the danger of bacterial invasion of the uterus in that it favors ascending infection. That this is true our tables would seem to indicate. Of the twenty-two patients from whom positive cultures were obtained, the membranes had ruptured before the beginning of the operation in fifteen. On the other hand, in the remaining seven patients the membranes were intact and were ruptured only to permit delivery of the child through the uterine incision. From this it is seen that intact membranes do not offer a thoroughly effective barrier to the access of bacteria to the lower uterine segment.

Without doubt, prolonged intrapartum infection is generally accompanied by an elevation of temperature. However, in fourteen of the twenty-two patients with positive cultures the temperature at the time of operation was normal. The remaining eight patients did have elevations of temperature but two of these were less than 100° F. On the other hand, in all of the twenty-eight patients with sterile uterine cultures, the temperature at the time of operation was normal. These results lead us again to the conclusion that, while elevation of temperature during labor is generally an indication of bacterial invasion of the uterus, a normal temperature at that time cannot be accepted as a reliable sign that bacterial invasion has not already occurred.

When our tables are studied to determine the bearing upon the sterility of the uterus of the time at which the operation was performed it is possible to draw definite conclusions. In twenty-nine patients who had been in labor for less than six hours when cesarean section was done, twenty-eight cultures from the lower uterine segment were found sterile and one showed the presence of bacteria; the latter being from a patient in whom labor had not yet begun but whose membranes had been ruptured for ten hours. On the other hand, the lower uterine segment was found infected in all twenty-one patients in whom labor had lasted six hours or more. Expressed in another way, it might be stated that no sterile cultures were obtained from patients in whom active labor had lasted for six hours or more and only one positive culture was obtained where labor had progressed less than six hours. We think that this affords conclusive evidence that the uterus is free of bacteria at the end of pregnancy, but only during the first few hours of active labor, and that the probability of the occurrence of ascending infection increases with every additional hour. Our investigations justify the conclusion that ascending infection is probably the greatest single factor in the explanation of the disastrous results that so often follow cesarean section. We have attempted to ascertain by analysis of our cases whether the duration of labor affects the types of bacteria found in the lower uterine segment, but our series is too small to permit a definite answer. Moreover, whether the type of organism found in the parturient uterus is influenced by the duration of labor, or whether the character of the infecting bacteria is a matter of chance, cannot, we think, be definitely determined until the question of autoinfection is conclusively settled, and it has been determined whether the bacteria found in the uterus originate from bacteria already in the vagina or whether they have made their way upward from the outlet by extension along capillary layers of fluid.

All of the fifty patients included in our study recovered and were discharged from the hospital in good condition. Four babies were lost. Two of these were born alive but died within the first week after

delivery. In one instance, the section was done for intercurrent eclampsia, the mother having recovered from the acute attack but failing to respond to further eliminative treatment. The baby was premature and died of that cause. The other baby, which was delivered alive after a low cervical cesarean section following attempted forceps delivery, died a few days later and at autopsy a large intracranial hemorrhage was found. The two remaining fetal deaths had no connection with the operation, as the children were known to be dead when it was undertaken. In both instances the uterus presented a pronounced contraction ring after attempts at version. In one instance, a multipara with several living children, the unopened uterus was supravaginally amputated, while in the other, the dead child was delivered by low cervical cesarean section. In both of these patients we felt that further attempts at delivery through the vagina would most likely result in rupture of the uterus.

Based on the bacteriologic study of fifty uteri at cesarean section as well as upon our clinical experience, an expression of our views as to the merits of the three types of operation commonly employed might be of value. We think that when cesarean section is definitely indicated the ideal time for its performance is at an appointed time at the end of pregnancy or at the very beginning of labor, and that in such circumstances the classical, conservative section is the operation of choice. The technical simplicity of the operation together with the short time necessary for its performance, as well as the excellent results which follow the elective operation, are factors worthy of consideration. We appreciate the danger of possible rupture of the scar in subsequent pregnancies but, as this accident occurred only twice in more than two hundred conservative sections performed in our clinic, we believe that this danger should not be a deterring factor, provided the patients are chosen with care and the uterine incision is sutured properly. On the other hand, our bacteriologic studies, as well as our clinical experience, have convinced us that the classical cesarean section is a dangerous operation when labor has progressed for more than a few hours. The incised involuting uterus is always a source of danger, and undoubtedly offers but little resistance to the invasion of bacteria from the uterine to the peritoneal cavity, especially when the incision is made in the body of the organ.

In appropriate conditions we regard the low cervical cesarean section as a great advance in operative obstetrics. Through its use we have been able to preserve the uterus in a number of patients in whom, prior to its introduction, it would have been unhesitatingly sacrificed, together with the possibility of future child-bearing. Moreover, it has served to displace pubiotomy and craniotomy on the living child. On the other hand, the technical difficulties, particularly early in labor, before the lower uterine segment has become thinned out, as well as

in obese patients with thick abdominal walls, make us unwilling to substitute it for the classical section at an appointed time at the end of pregnancy or early in labor. We have come to regard it, nevertheless, as the operation of choice in patients in whom the time of election has passed but in whom there is no clinical evidence of infection and where it is desired to obtain a living child without the sacrifice of the uterus. Since in a large majority of our low cervical sections the convalescence has been prolonged and so many incisions have failed to heal by primary union, together with the fact that many of the patients impressed us as being seriously ill, we are not ready to extend its use to frankly infected patients. Indeed, even in the great majority of the cases in which we advocate its employment, our bacteriologic studies have shown that the uterus is already infected. As pointed out by DeLee,<sup>11</sup> however, probably due to the location of the uterine incision, the protective mechanism of the human body is better able to cope with infection in the pelvic connective tissue than in the free abdominal cavity.

While it is true that the introduction of the low cervical cesarean section has reduced the frequency of the radical operation in this service, we believe that the latter procedure still has an important function in operative obstetrics, especially in two types of cases. It is our experience that in the frankly infected patient the removal of the uterus at the time of section has resulted in no greater mortality than follows the classical operation done at the time of election. Consequently, whenever cesarean section becomes necessary in the presence of frank infection we feel that it should be followed by supravaginal amputation of the uterus. Furthermore, when for any reason it is desirable to effect sterilization at cesarean section, and the preservation of the menstrual function is a matter of indifference to the patient, we follow the same course. By so doing the wounded uterus is removed, the formation of adhesions is reduced to a minimum, and many of the dangers that follow the more conservative procedures are eliminated. We have been impressed repeatedly by the fact that the convalescence following radical section is smoother and more likely to be devoid of complications than after any other type of cesarean section. For these reasons, we still believe that it is a valuable procedure which will render satisfactory service in many desperate cases.

#### CONCLUSIONS

1. This paper is based upon the bacteriologic study of the uterine contents obtained at fifty cesarean sections.
2. In nineteen elective sections performed at an appointed time at the end of pregnancy and before the rupture of the membranes, the uterus was uniformly sterile.

3. The same applies to six cases in which the classical section was performed within four hours after the onset of labor.

4. In five patients in whom classical section was performed six or more hours after the onset of labor, bacteria could always be demonstrated in the lower uterine segment and there were streptococci in three of the cases.

5. Similar results were obtained in thirteen low cervical and six radical sections, and the uterine contents were sterile only in the three cases in which the operation was performed within a few hours after the onset of labor.

6. These bacteriologic findings clearly show why the conservative section is safe only when performed at the time of election.

7. While vaginal examinations and premature rupture of the membranes undoubtedly increase the likelihood of bacterial invasion of the uterus, the absence of these factors in no way insures a sterile uterus.

8. Elevation of the temperature, likewise, is a valuable sign of intrapartum infection, but a normal temperature cannot be accepted as evidence that ascending infection has not already occurred.

9. Whether the presence of bacteria in the uterine cavity is due to the upward extension of bacteria already in the vagina or to an ascending infection from the vulva cannot be determined until comprehensive studies of the bacterial flora of the vagina have shown whether the occurrence of autoinfection is possible or not.

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# CARCINOMA OF THE CERVIX UTERI AS TREATED IN THE GYNECOLOGIC DEPARTMENT OF THE UNIVERSITY HOSPITAL

(SERIES II, 1919-1923)

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THE following study of carcinoma of the cervix is based on a group of 214 patients who came to the University Hospital during the years 1919 to 1923. Of this number, 30 cases have been discarded because their records are incomplete, or their course could not be traced. The remaining 184 cases serve as the basis for this report, of these 94 were treated, five or more years ago, of which 13 are living, or 13.8 per cent apparent cures. Three years have passed since treatment in 161 cases, with 27 or 16 per cent apparent cures.

There were 69 cases in which no pathologic diagnosis was available. The description of the lesion and the clinical diagnosis are reliable, however, as a positive diagnosis. Our experience has shown that there is an error of less than 1 per cent in the clinical diagnosis when checked by microscopic examination of the tissue. Most of our cases without pathologic confirmation were those in which large craters were found and were treated before biopsy was made a routine procedure.

In one of our cases we were unable to get a positive diagnosis of carcinoma after eleven slides had been examined microscopically, but the subsequent course of the case with metastasis to the bladder proved beyond a doubt that the case was one of carcinoma of the cervix.

The abstract cards furnished by the American College of Surgeons were used in briefing our cases, and we have used their groupings in our tabulations:

1. Primary case.
2. Previous panhysterectomy for carcinoma.
3. Previous supracervical hysterectomy.
4. Diseases confined to cervix.
5. Diseases involving uterus or vaginal walls.
6. Broad ligaments involved.
7. Wide metastasis.

Our study was made with the following outline in view:

First, to obtain a summary of the first or initial symptoms noticed by the patients.

Second, to obtain a summary of the symptoms of which the patients complained when they applied for treatment. These we have called the presenting symptoms. An effort was made to form a relationship

between these symptoms and the extent or form of the disease discovered clinically.

Third, since nearly all of these patients received a relatively constant form of treatment (radium, with or without a palliative operation), to determine the effect of the various variables on the results of the treatment. The variables are:

1. Duration of disease before treatment; i.e., interval from first symptom to first treatment.
2. Age of patients.
3. Pathologic type of disease.
4. Extent of disease.
5. Type of treatment.

A study of the mode of death was made to determine if possible the usual direction of extension of the process in order to form a more logical method of subsequent treatment. The results of treatment are given in each case, in terms of duration of life, and, finally, a summary of the results was made, showing the effect of irradiation on the symptoms—pain, hemorrhage, and discharge.

#### INITIAL SYMPTOMS AND PRESENTING SYMPTOMS

The first or initial symptoms noted by the patients coming for the treatment for carcinoma of the cervix are given below:

1. Intermenstrual spotting.....	32.6 per cent
2. Irregular vaginal bleeding.....	29.8 per cent
3. Profuse menstrual flow.....	2.2 per cent
4. Bleeding after coitus.....	1.6 per cent
5. Spotting when changing pessary.....	1.0 per cent
6. Spotting and thin discharge.....	7.2 per cent
7. Foul, profuse, watery leucorrhea.....	16.6 per cent
8. Pelvic pain and discharge.....	1.0 per cent
9. Sudden increase of amount of leucorrhea.....	1.0 per cent
10. Rectal pain.....	1.0 per cent
11. Sacral backache.....	1.0 per cent
12. Frequency of urination.....	0.5 per cent
13. Mass in the vagina.....	0.5 per cent
14. Vaginal soreness.....	0.5 per cent
15. Lower abdominal and pelvic pain.....	2.2 per cent

Of this group of symptoms 74.4 per cent have to do with hemorrhage in some form, 25.8 per cent deal with discharge, and 5.7 per cent concern pain.

The symptoms present when the patient came for treatment fall into three main groups: bleeding, discharge, pain, or combinations of these three.

A fourth group, urinary symptoms, viz.: frequency, urgency, vesical irritability, dysuria, and incontinence is often associated with these.

Practically all patients complained of constipation to a greater or lesser degree. The groups follow:

1. Bleeding, discharge and pain-----	54.7 per cent
Of this group 30 per cent had urinary symptoms in addition.	
2. Bleeding and discharge-----	30.9 per cent
Of this group 16 per cent had urinary symptoms in addition.	
3. Bleeding and pain-----	7.2 per cent
Of this group 23 per cent had urinary symptoms in addition.	
4. Bleeding (alone)-----	1.6 per cent
5. Discharge (alone)-----	1.6 per cent
6. Pain (alone)-----	1.0 per cent
7. Discharge and pain-----	1.0 per cent
8. Mass in vagina-----	0.5 per cent

Of this group of symptoms 94.4 per cent have to do with hemorrhage in some form, 88.2 per cent deal with discharge and 63.9 per cent concern pain.

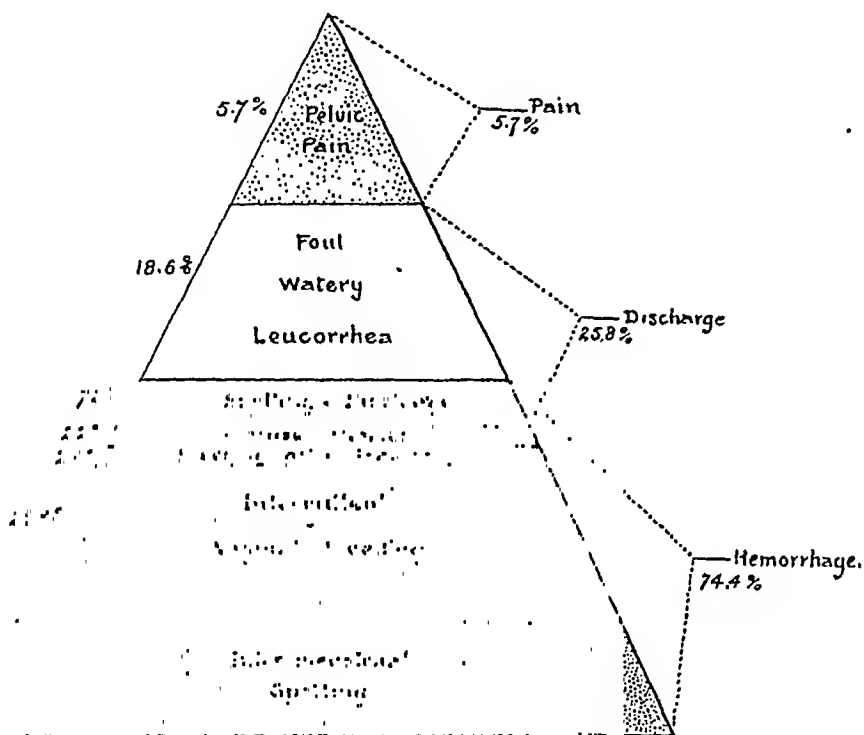


Fig. 1.—Pyramid of initial symptoms of carcinoma of the cervix built on hemorrhage, tipped with pain.

A comparison of these figures with those of the preceding table shows an increase in all the figures. Hemorrhage noted as the first symptom in three-fourths of the cases, is a prominent symptom in nearly every case coming for treatment. Discharge was noted as an initial symptom in one-fourth of the cases, but is present in seven-eighths of the cases on admission. Pain, unfortunately rather infrequent (5.7 per cent) as an early symptom, occurs as a presenting symptom in nearly two-thirds of the cases.

Patients too often put off their treatment until pain becomes prominent or until bleeding and discharge become excessive.

In our analysis of these cases, we find that the severity of the symptoms bears no constant relation to the extent of the disease.

TABLE I  
DURATION OF SYMPTOMS

GROUP	LESS THAN									TOTAL
	3 MOS.	3 MOS.	6 MOS.	9 MOS.	1 YR.	1½ YRS.	2 YRS.	3 YRS.	4 YRS.	
A.	5	10	3	1	4	1	1			25
B.	3	5	4		3	1		1		17
C.	13	19	14	11	26	4	8	1	1	97
D.	1	2	9	3	3	2	3			23
5 yr. cures	1	7	1		1	1		1		12

Of those patients who came for treatment within six months from the time of their first symptom: 20 per cent were in Class A, 13.8 per cent were in Class B, 55 per cent were in Class C and 5 per cent were in Class D. (Table I.)

Sixty per cent of those patients treated within six months from the time of their first symptom were in the advanced stage of carcinoma; 14 cases in this advanced group had their symptoms less than three months before treatment. In view of these facts, we may say that the duration of the symptoms bears little or no relation to the extent of the carcinoma.

Of those cases who came for treatment six months or more after the first symptom had been noted: 9.5 per cent were in Class A, 9 per cent were in Class B, 62.5 per cent were in Class C and 19 per cent were in Class D.

Eighty-one per cent of the patients who appear in the hospital six months or more after the first symptoms are in the inoperable stage.

Early treatment offers more hope for a cure of the disease. Thirteen and eight-tenths per cent of the cases treated within six months from the first symptom are "five year" cures, while, of those treated after their symptoms had been present six months, only 3.8 per cent are "five year" cures.

#### PATHOLOGIC TYPE OF DISEASE

In this series, the epithelioma group was not divided into basal and squamous-celled types. Two groups then are presented, the adenocarcinomata and the epitheliomata. There were 114 cases with pathologic diagnosis, and of these 15, or 13.5 per cent, were adenocarcinomata, and 99, or 86.5 per cent, were epitheliomata.

Of the adenocarcinoma group, there were 2 five year cures, 13 per cent, and 3 three year cures, 20 per cent. Of the epithelioma group, there were 10 five year cures, 10.4 per cent, and 17 three years cures, 17.7 per cent. Little difference, therefore, is noted in the success of treatment in either type of cancer. We are unable to confirm the lack of success experienced by other writers (Cullen) in their treatment of the adenocarcinoma group.

The cases which develop in younger women, below fifty, seem less responsive to treatment. Of the 27 three year cures, eleven cases, or 40.6 per cent are under fifty and sixteen cases or 59.4 per cent are over fifty. Of the thirteen five year cures, four cases or 30 per cent are under fifty and nine cases or 70 per cent are over fifty. Of the 85 cases who were under fifty years of age 4.7 per cent are five year cures. Of the 98 cases who were over fifty, 9.8 per cent are five year cures.

Since the data to follow deals with the results of treatment, the figures used may require a word of explanation. Our data are compiled from the records of cases treated during the years 1919 to 1923, and our work was completed in 1925. Only a certain portion of our cases then, are eligible in compiling five year statistics, and these we

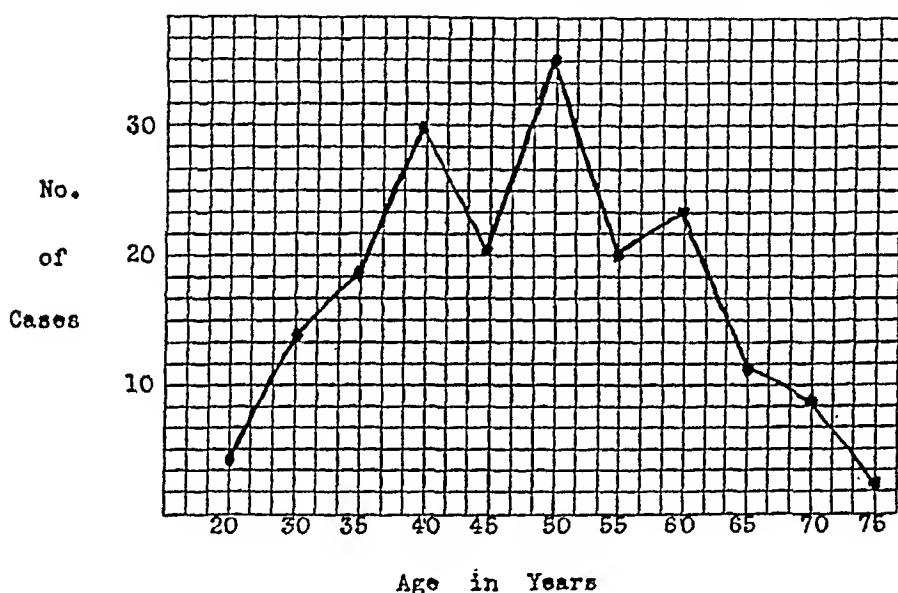


Fig. 2.

have designated as having "passed the five year interval." In the same way, our three year statistics are compiled from those cases who were treated three or more years before our analysis was made, and are designated as having "passed the three year interval."

TABLE II  
LENGTH OF LIFE

GROUP A CASES TREATED BY	LESS THAN 1 YR.	YEARS							OPERATIVE FATALI- TIES	DIED OF OTHER CAUSES	TOTAL
		1	2	3	4	5	6	?			
Radium alone		5	2	2			2			1	12
Cautery, amputation plus radium			1	2		3	2		2		10
Hysterectomy plus radium	1	1									2
GROUP B											
Radium alone	6	3	2	1				1	1	1	15
Cautery plus radium	1				1			1			3
Hysterectomy plus radium						1					1

The operative mortality of Group A was 20 per cent, and that of Group B, 7 per cent. (Table II.) These groups comprise the operable and borderline cases.

Of Group A, thirteen have passed the five year interval. Seven were treated with radium (alone) with two five year cures,—28.5 per cent. Six were treated with cautery and radium with five five year cures,—83 per cent. Total five year cures, seven, 53.8 per cent.

Twenty-one cases have passed the three year interval. Eleven were treated with radium (alone) with four three year cures,—36 per cent.

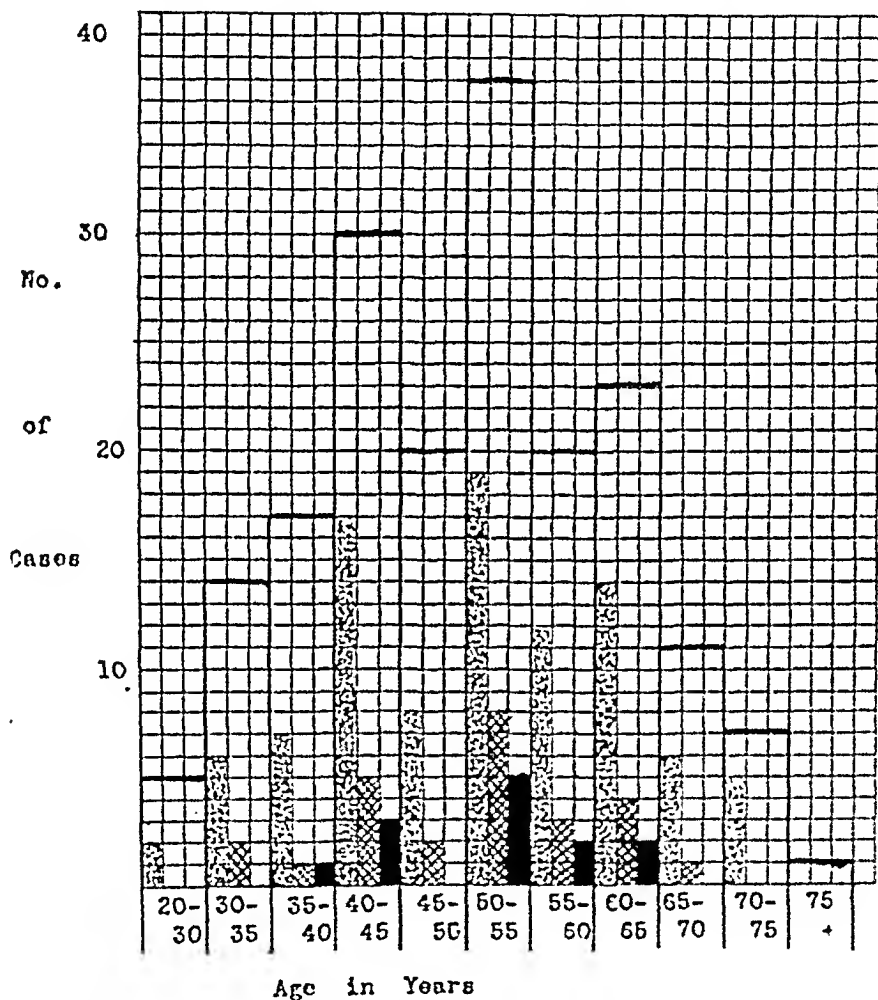


Fig. 3.—Each block represents a period of five years. In the first column, dotted, are represented patients who lived one year after treatment. In the second column, shaded, are represented patients who lived three years after treatment. In the third column, black, are represented patients who lived five years after treatment.

Ten were treated with cautery and radium with seven three year cures,—70 per cent. Total three year cures, eleven, 52 per cent.

Of Group B, twelve cases have passed the five year interval. Nine cases were treated by radium (alone) with no five year cures. Two cases were treated with cautery and radium with no five year cures. One case was treated with radium and hysterectomy with one five year cure. Total five year cures, one, 8.3 per cent.

Fifteen cases have passed the three year interval. Of these, twelve cases were treated by radium (alone) with one three year cure. Three cases were treated by cautery and radium with one three year cure. One case was treated by radium and hysterectomy with one three year cure.

Of Groups A and B, but three cases were operated upon with one cure. Twenty-seven were treated with radium, and thirteen with high frequency cautery amputation plus radium. Although the group is too small to make positive deduction, the high cervical amputation with the cautery, immediately followed by radium, seems to give the best results in these early cases. It seems probable that a removal of all the growth may frequently be accomplished by this method, and when some of the carcinomatous tissue remains, it is more easily and more directly exposed to the radium rays. The prognosis is much less favorable when the disease has progressed beyond the cervix.

TABLE III  
INOPERABLE GROUP

GROUP C	LESS THAN 1 YR.	1	2	YEARS							FATAL	DIED OF OTHER CAUSES	TOTAL
CASES TREATED BY				3	4	5	6	7					
Radium alone	33	21	11	3	2	1	1	3		0		3	78
Cautery and radium	4	4	4			1				1			14
Hysterectomy and radium													
GROUP D													
Radium alone	10	7	2	1									20
Cautery and radium													
Hysterectomy													

Of Group C (Table III), forty-four have passed the five year interval. Of these, thirty-nine were treated by radium (alone) with two five year cures, 5 per cent. Five were treated by cautery and radium with one five year cure. Total five year cures, three, 7 per cent.

Seventy-two cases have passed the three year interval. Of these, sixty-one cases were treated by radium (alone) with seven three year cures, 11 per cent. Eleven were treated by cautery and radium with one three year cure. Total three year cures, eight, 11 per cent.

Of Group D (Table III), nine cases have passed the five year interval with no cures. Fourteen have passed the three year interval with one cure.

When the disease has extended beyond the uterus into the broad ligaments and paracervical tissues, the possibility of a cure is most remote. The relief of symptoms is the best that can be hoped for in these cases. Occasionally, usually in a patient well past fifty years, a five year cure may be obtained, but such results come as a surprise rather than an expectation. Radium, alone, has proved the best means of therapy in these cases, in our hands, except where the growth is of

TABLE IV  
LENGTH OF LIFE

GROUP 4 (A, B, C, D)	MONTHS					YEARS									OP.
	NO.	3-6	6-9	9-12	1-2	2-3	3-4	4-5	5-6	A	B	C	D	DEATH	
Cases dead (after treatment)	14	2		5	3	2	1						14	1	
Cases living	2								2	2					

the cauliflower type, where the irradiation may be preceded by a cantery excision of the growth.

Group 4 (Table IV) (A, B, C, D) where carcinoma developed in the cervical stump following supracervical hysterectomy.

Of these cases, ten were first treated five or more years ago with two apparent cures. Both of these cases had cervical involvement only. In the three year group are fifteen cases, with three cures. All the cases were treated with radium, alone, except one case in which a cautery amputation of the growth was followed by radium. This case lived three years, but died of cancer.

The possibility of fistula formation after irradiation is decidedly

TABLE V  
CASES OF RECURRENCE FOLLOWING PANHYSTERECTOMY FOR CANCER

	MONTHS				YEARS				NO. CASES
	?	3-6	6-9	9-12	1-2	2-3	3-4	4-5	
Length of life from time of radium application		1	1	1	2	1	3	1	11

increased in those cases where carcinoma has developed in the cervical stump following a supracervical hysterectomy. Three developed in our sixteen cases, an incidence of 18.7 per cent. Two of them were ureterovaginal, and one was vesicovaginal.

Of this series of eleven cases (Table V), three of the panhysterectomies were performed in the University Hospital. In one case, radium was applied three days before hysterectomy, seven days before in another, and four months afterwards in the third.

Eight cases were referred to our clinic for treatment following a panhysterectomy which had been performed elsewhere. Five cases

TABLE VI  
TYPE OF TREATMENT

<i>Radium alone</i>		
DURATION OF LIFE AFTER TREATMENT	TOTAL CASES	PERCENTAGE OF CASES
Less than 1 year	55	41 %
1 year plus	69	51.5 %
2 years plus	31	23 %
3 years plus	13	
5 years plus	4	



lived two years after radiation, and 2 lived three years. There was one five year cure. One case developed both a rectovaginal and vesicovaginal fistula after radiation.

Radium was used in 134 primary cases. There were two operative mortalities. One death was due to septicemia four days after a simple application of radium to the cervix. The other case developed obstinate vomiting and died in the hospital one month after irradiation. Operative mortality, 1.4 per cent. The first irradiation was done five or more years previously in 68 patients, and of that number four are living, 5.9 per cent. Of these cures, 2—A, and 2—C.

*These 68 cases:* 9—A—13 per cent, 9—B—13 per cent, 37—C—54.4 per cent, 9—D—13 per cent, 4—Class not given.

One hundred and seven presented themselves for treatment three or more years ago; of these, fourteen cases are living, 12 per cent.

OF THESE 3 YEAR CURES:      AND THE 107—WHOLE GROUP:

4—A	12—A
2—B	12—B
7—C	65—C
1—D	14—D
	5—Class not given.

One case of vesicovaginal fistula developed. Five cases died of causes other than cancer, four of whom were relieved of their symptoms at the time of their death.

	CAUSE OF DEATH	CLASS	TIME SINCE TREATMENT	RELIEVED
(1)	Cardiac	B	8 months	Plus
(2)	"	C	1 month	?
(3)	Cardiorenal dis.	C	2 months	Plus
(4)	Embolism	C	4 months	"
(5)	Apoplexy	A	4 months	"

Radium dosage averaged less than 2400 mg. hours per patient. The largest amount in the five year cures was 2400 mg. hours and the smallest amount, 1200 mg. hours.

TABLE VII  
CAUTERY AMPUTATION AND RADIUM

DURATION OF LIFE AFTER TREATMENT	TOTAL CASES		
	CASES DEAD	CASES LIVING	
Less than 1 year	6		
1 to 2 years	5	1	
2 to 3 years	1	2	
3 to 4 years	1	2	
4 to 5 years	1		
5 to 6 years		6	
Op. Fatality	3		
Totals	17	11	
TOTALS			TOTALS
1 year plus	8	11	19
2 years plus	3	10	13
3 years plus	2	8	10
5 years plus		6	6

Cautery amputation and radium were used in twenty-eight cases. (Table VII.) By these terms, we mean that the growth, and usually the cervix, was amputated, in most cases by cautery, or the cervix and growth were amputated with knife or scissors followed by cauterization of the stump. The best results followed the immediate application of radium after the cautery had been applied. Three operative fatalities occurred in the twenty-eight cases, 10.6 per cent. Two of these patients died from septicemia. In one of these cases a pyometra was present at the time of treatment. The third case died from peritonitis following the development of a rectovaginal fistula. Two fistulae occurred, one uterovaginal, and one rectovaginal. Of the twenty-eight cases, fourteen have passed the five year interval with six cures, 42.9 per cent. The six cures were: 5—A, and 1—C. Of these fourteen cases, seven, 50 per cent, were in Group A.

Twenty-four cases have passed the three year interval since the first treatment, and of this group ten are living, 41.6 per cent cures. Of the ten apparent cures, seven or 70 per cent were in Group A.

Cautery amputation of the cervix and radium gave the best results of any form of treatment. This procedure is most applicable to the early cases. The operative mortality is considerably higher than when radium alone is used.

#### RESULTS OF TREATMENTS

	RELIEVED	LESSEMED	INCREASED	UNCHANGED
Pain	19.6 per cent	7 per cent	65 per cent	21 per cent
Hemorrhage	54 per cent	24.5 per cent	8.6 per cent	12.5 per cent
Discharge	34 per cent	36 per cent	14 per cent	16 per cent

*Duration of Relief.*—Less than three months, 5.4 per cent; three months, 4.6 per cent; six months, 18 per cent; nine months, 11.4 per cent; one year, 19.4 per cent; two years, 12 per cent; three years, 4 per cent; five years, 4 per cent; six years, 4 per cent; and not benefited by radium, 16 per cent.

The percentage figures in the above lists are calculated on the number of cases in which the appropriate information was available. It is seen that in three-fourths of the cases radium was beneficial in relieving the bleeding and discharge for a time. The average duration of relief was about one year. Local healing was reported in forty-two cases, 22.8 per cent. Of these, eighteen cases showed extension of the process later, five to the anterior vaginal wall, two to the bladder, ten deep in the pelvis, usually in the uterosacral areas, and one to the liver.

Pain may be temporarily relieved by radium in some cases, but in another large group of cases, radiation seems to be followed by an increase of pain. It is a question whether this increase is not due to the natural course of the disease, rather than to the method of treatment.

## MODE OF DEATH

The mode of death was recorded in 92 cases. These have been tabulated as follows:

	Cases
Wide pelvic metastasis, usually with extreme pelvic pain and in many cases pain in thighs and legs from involvement of adjacent nerve trunks	32
Marked cachexia	17
Fatal vaginal hemorrhage	4
Recurrence involving rectum and bladder	4
Rectal metastasis	9
3 developed intestinal obstruction	
1 died of an acute hemorrhage	
Uremia, from ureteral involvement	5
Bladder metastasis	5
2 ureterovaginal fistulae developed	
3 vesicovaginal fistulae occurred	
Recurrence in anterior vaginal wall	4
General abdominal metastasis	2
Bone metastasis	2
Metastasis to left axilla	1
Hepatic metastasis	1

There were six operative deaths due to the following causes:

	Cases
Septicemia	3
2 following cautery and radium	
1 following radium alone	
Femoral and pelvic phlebitis, followed by uremia, after cautery and radium	1
Peritonitis with rectovaginal fistula after cautery and radium	1
Persistent vomiting following radium alone	1

Five other cases died of causes not due to cancer:

	Cases
Cardiac failure	2
Cardiorenal disease	1
Cerebral embolism	2

Four of these cases are noted as being symptom-free at the time of their death. The other is not recorded.

The commonest direction of extensions of the carcinomatous process seems to be posteriorly, either along the uterosacral ligament to involve the anterosacral structures or down and back to involve the ureters and rectum. Pain is the chief symptom as the anterosacral tissues and nerves are invaded, while appropriate obstructive symptoms develop if the rectum and ureters are involved.

Extension of the carcinoma anteriorly is not rare, but much less common than the posterior growth.

Nearly all patients who die show a marked degree of cachexia, probably due to a prolonged absorption of toxic product from the infected carcinomatous ulcer. This element combined with a marked

anemia, secondary to the frequent vaginal hemorrhage, contributes largely to the death in many cases.

Acute hemorrhage may terminate any extensive case of carcinoma of the cervix. It was the immediate cause of death in 5 per cent of our recorded cases.

Metastasis from carcinoma of the cervix may be found almost anywhere in the body. One recent case, not in this series, died with cerebral metastasis.

#### SUMMARY OF THE CASES OF CANCER OF THE CERVIX

1. Thirteen out of ninety-four cases lived five years or more after treatment, 13.8 per cent five year cures.

Twenty-seven out of 161 cases lived three or more years after treatment, 16 per cent three year cures.

2. The first symptom in three-fourths of the cases concerns hemorrhage in some form.

3. Patients usually wait until bleeding and discharge become excessive, or until excessive pain forces them to seek medical attention.

4. Of all those cases who came for treatment within six months from the time of their first symptom, 60 per cent were inoperable.

A case treated during the first six months of disease has one chance in seven of a five year cure.

A case treated after the first six months of disease has one chance in twenty-six for a five year cure.

5. Of the series, there were 13.5 per cent adenocarcinomata, and 86.5 per cent epitheliomata. Approximately the same results were obtained in the treatment of each type.

6. The older the patient, the better the prognosis for prolongation of life, or actual cure of the disease.

7. In Group A: Radium alone cured two in seven cases, 28.5 per cent five year cures. Caution and radium cured five in six cases, 83 per cent five year cures.

8. In Group B: Radium or cautery plus radium gave no five year cures in eleven cases. There was one case of hysterectomy plus radium living five years.

9. In Group C: Radium alone cured two in thirty-nine cases, 5.1 per cent five year cures. Caution and radium cured one in five cases, 20 per cent five year cures.

10. In Group D: There were no five year cures in nine cases.

11. In all classes of cases: Radium alone cured four in sixty-eight cases, 5.9 per cent five year cures with an operative mortality of 1.4 per cent. Caution, amputation and radium cured six in fourteen

eases, 42.9 per cent five year cures, with an operative mortality of 10.6 per cent.

12. Radium was effective in temporarily relieving hemorrhage and discharge in 75 per cent of the cases treated. Pain may be relieved for a time, but in a considerable number of cases, pain seems to be increased by radiation. The average duration of relief of symptoms was about one year.

2017 WALNUT STREET

## SOME RESULTS OBTAINED WITH PARATHYROID EXTRACT IN THE CONTROL OF IDIOPATHIC MENSTRUAL BLEEDING

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IN THE first complete report of success in raising the blood calcium of dogs and in controlling tetania parathyreopriva by the injection of an extract prepared from the parathyroid gland, Collip<sup>1</sup> mentioned the fact that the viscosity of the blood of these dogs was increased as the calcium content became greater. He noted further, that the blood in the heart and in the great vessels was usually clotted within a few minutes after death, and especially was this true if death were due to the marked rise in blood calcium which he has called hypercalcemia.

In repeating some of the work of Collip, and in making a study of the condition of hypercalcemia previously described by him, this increased viscosity of the blood was noted and our attention was called to the fact that the clotting time was so short that it was difficult to obtain blood directly from the heart of the living animal through a large-bore needle. Further observation revealed the fact that when vessels as large as the internal mammary were severed, bleeding was minimal and stopped very quickly.

The clinical possibilities of such information presented themselves to us. If therapeutic amounts of the parathormone were given to patients we might reasonably expect a similar shortening of the clotting and bleeding time and consequent reduction of blood loss, in cases of prolonged menstrual bleeding.

The problem of regulating the length of the menstrual period and the actual blood loss of that class of unfortunates known as idiopathic menstrual bleeders has long interested the gynecologist. The vitality and strength of these patients are so often exhausted by the long and profuse bleeding that they do not recover completely from one menstrual period before the next begins.

Previous investigators have found that operative measures or the

administration of ergot, pituitrin, and other oxytocics, afford, at best, only temporary relief. Radium and x-ray therapy have been used in various clinics, and these rather radical measures have produced varying degrees of benefit from a slight reduction in the blood loss to a permanent and complete amenorrhea and sterility. Because of their effect on the maturing ova they must be used with extreme caution, and we doubt their practical application to the problem of controlling this idiopathic menstrual bleeding. Surgical procedures, including the removal of the uterus, have been found necessary in the past in some instances, where all other measures failed to correct the condition.

Although our results cannot be taken as conclusive, they are at least suggestive of the possibilities of the hormone if used in the optimum dosage and at the proper time. We have used comparatively small doses of the extract (Parathormone, Lilly) in the beginning, and by gradually increasing the amounts, have endeavored to establish a minimal dose that can be used with satisfactory clinical results. We do not feel that we have yet reached the most satisfactory dose limit.

Fortunately the percentage of patients suffering from a condition such as the one with which we are dealing, is very small. We were able to locate for our work three patients who could be definitely classed as idiopathic menstrual bleeders, and a fourth bleeder whose only pelvic pathology was an enlarged cystic ovary on the right side.

We know, of course, that this is a very small series and that our methods of determining blood loss are open to question. We offer our results only as a preliminary report, hoping thus to stimulate investigation along this line.

It is not possible by any laboratory methods known to us to determine, without some degree of error, bleeding or clotting times. In order to reduce the percentage of error to the smallest possible degree, one man has made all of the determinations. The capillary pipette method was used. Blood was drawn into the tube from a fresh ear puncture and sections of the tube were broken off every fifteen seconds. The end point was recognized when a string of fibrin appeared.

In our attempt to determine the relative amounts of blood lost at each period the patients have kept their pad counts and we have been compelled to rely upon their judgment as to the amount of blood lost with stool and urine.

The calcium determinations were made by one of us (W. C. A.). The Tisdall serum method on 2 c.c. portions of blood plasma secured by centrifuging blood collected upon heparin, which delays coagulation, was used.

We found that we obtained our best results when we divided the

amount of hormone to cover a three- or four-day period. It is possible that much more striking results may follow the use of larger doses, for we have been unable to obtain more than the normal menstrual rise in the blood calcium thus far. In our subsequent work we shall gradually increase the amount given at each period until we have determined what we consider the safe optimal dose.

At present we are inclined to recommend a total dosage of from 120 to 160 units, given in divided doses of 20 units, morning and evening. The best results were obtained by starting the intramuscular injection the day before the period was due.

The case records of the individuals we have treated are given below:

CASE 1.—The patient had a chronic pharyngitis for two years with temperature of 99°-99.4°. At the time of her menstrual period it usually went up to 99.8°.

Menstruation which began at thirteen years of age, has been irregular, varying from 18 to 29 days. The periods last from 5 to 7 days and during the months just prior to beginning the parathormone therapy they have all been from 6 to 8 days and very profuse.

TABLE I, CASE 1

DATE	NOTATION	THERAPY (UNITS EXT.)	CLOTTING TIME	BLEEDING TIME	DAYS LASTED	TOTAL PADS	BLOOD CALCIUM MG. PER 100 C.C.
April 3	Period began	None	Not taken	Not taken			
April 9	Stopped	None	Not taken	Not taken	7	20	Not taken

*Remarks:* The patient suffered from cramps and headache on the second and third days and from nausea on the fourth and fifth days.

April 27	Began to	0	3' 30"	2'			
April 28	menstruate	0					
April 29		80					10.52
April 30		0	1' 10"	55"			10.77
May 2		0			5	17	

*Remarks:* The doses were very large and were given within a few hours of each other. The patient suffered from nausea, chills, vomiting, and a severe headache, with temperature of 103.6° within three hours after the first injection of the parathormone. On the morning after the injection of this rather massive dose the bleeding stopped completely for about six hours, when it began again but stopped completely on May 2. The patient complained of some dizziness on the next day and of headache on the second and the third day after this injection. Forty of the 80 units were given intravenously.

May 19	Entered hospital	6					9.28
May 20		8	3' 30"	3' 15"			
May 21		8					
May 22	Began to menstruate	8					
May 23		25					
May 24		18	2' 15"	3'			
May 25		0					10.07
May 26	Went home	0					
May 28	Stopped	0			6	23	

*Remarks:* All of the injections here listed were given subcutaneously. This period was complicated by a slight operation on the patient's eye on May 23, and by a copious hot enema on May 24. The amount of hormone was only 73 units,

30 of which were given during the three and a half days that the patient was in the hospital before the period began. The total amount of hormone was not sufficient and was distributed over too long a period to obtain any noticeable effect.

TABLE I, CASE 1—Cont'd

DATE	NOTATION	THERAPY (UNITS EXT.)	CLOTTING TIME	BLEEDING TIME	DAYS LASTED	TOTAL PADS	BLOOD CALCIUM MG. PER 100 C.C.
June 15	Began to menstruate	6	3'	3'			11.06
June 16		6					
June 17		8 subcut. 15 intrav.					
June 18		12 subcut. 15 intrav.					
June 19		15 subcut. 15 intrav.					
June 22	Stopped	0			5½	14	11.26

*Remarks:* This period was the best that this patient has had, and she is enthusiastic about continuing the treatment. She received a total of 91 units of the parathormone, which is a very small amount when distributed over several days. Her loss of blood was much less than that of the usual period, and her discomfort consisted merely of headache and slight nausea, with some mild cramps.

CASE 2.—The patient was a large woman, aged twenty-six. She began menstruating at the age of sixteen. Her periods were regular, 28 days, and lasted six days. She was well until June, 1925, when the periods became much prolonged, lasting from two to three weeks. She was curretted on February 28, 1926, but without relief. When she entered the hospital for parathormone injections on May 14, 1926, she had been bleeding continuously since April 8, 1926, using four pads each day, also passing large clots with stool and urine.

TABLE II, CASE 2

DATE	NOTATION	THERAPY (UNITS)	CLOTTING TIME	BLEEDING TIME	DAYS LASTED	TOTAL PADS	BLOOD CALCIUM MG. PER 100 C.C.
Apr. 8	Began to menstruate						
May 14	Entered hospital	50	3' 30"	2' 30"			Lost
May 15		25					
May 16		45	2' 30"	2' 30"			9.9
May 17		50					
May 18		0					9.78
May 21	Went home	30					

When she went home on May 21, her condition was much better than when she entered. Just before being discharged from the hospital an injection of 30 units was given, and three days later she called us and reported that the bleeding had stopped entirely. Two weeks later she passed through a normal menstrual period of five days, using eighteen pads, and there has been no bleeding during the last three weeks.

CASE 3.—The patient was thirty years of age and for six years previous to entering the hospital for her first parathormone injection, menstruation had been profuse. The periods lasted six to seven days and on the first and second day they assumed the character of a severe hemorrhage. She usually used twenty-four pads which were well soaked through. Several months before entering the hospital for the parathyroid extract therapy she was curretted, but since that time the periods have been as bad or worse than at any time before.



TABLE III, CASE 3

DATE	NOTATION	THERAPY (UNITS)	CLOTTING TIME	BLEEDING TIME	DAYS LASTED	TOTAL PADS	BLOOD CALCIUM MG. PER 100 C.C.
May 25	Began	8	3'	2'			9.58
May 26		30					
May 27		34					
May 28		30	1' 30"	1' 20"			11.10
May 29	Stopped	25			4½	16	

Total parathormone—127 units, all given subcutaneously.

Rise in blood calcium (after 72 units) 1.52 mg. per 100 c.c. blood.

*Remarks:* These results so encouraged the patient that she was very anxious to repeat the treatment the next month. It should be noted here that the first injection of the extract was given after the period had already become profuse and that the effect did not become apparent until the worst of the period was almost passed, eleven of the sixteen pads being used during the first forty-eight hours. The greatest amount of hormone that had ever been given to date was used in this instance and it is interesting to note that there was the greatest rise in blood calcium as well as the greatest improvement. The patient stated, emphatically, that she had been stronger and more nearly well between this period and the next one than at any time in months.

June 19	Began	15 subcut.	2' 40"	2'			10.17		
		15 intrav.							
June 20		15 subcut.	1' 30"	1' 40" 4 13			10.46		
		15 intrav.							
June 21		10 subcut.							
June 22	Stopped	20 intrav.							

Total parathormone—90 units, intravenously and subcutaneously.

Rise in blood calcium 0.3 mg.

*Remarks:* The patient declared that this was by far her easiest period. Several of the thirteen pads were almost unsoiled when changed. During the entire time of this period she was crossing the city daily by way of the elevated lines, coming from her home to the hospital and returning, and although her periods were usually made much worse by activity, no effect was produced at this time. She is also convinced that the amount of blood lost with stool and urine was only about one-third the normal loss. The fact that the amount of blood calcium per 100 c.c. at the beginning of this period was considerably higher than at the beginning of the preceding period, suggests the possibility that the calcium rise which follows the parathormone injections may be more nearly permanent than might at first have been expected.

CASE 4.—Menstruation began at the age of ten. The first period was normal, but the second period lasted twenty-one days and all subsequent periods have been profuse. She was first seen in our clinic at the age of eleven. Her blood coagulation time then was 3' 30", which is well within normal limits. She has been in the hospital six times for treatment which included injections of pituitrin, ergot, stypticin, horse serum, and milk. Following the milk injections she had severe reactions and there was some evidence of decrease in the amount of blood lost at the time, but the effect did not last. She is now seventeen years of age, and since January, 1926 the periods have been eight to nine days in length and she has had to remain in bed during the entire time, using from twenty to twenty-nine large homemade pads which are fully twice as heavy as the hospital pads that she used while receiving the parathormone injections.

TABLE IV, CASE 4

DATE	NOTATION	THERAPY (UNITS)	CLOTTING TIME	BLEEDING TIME	DAYS LASTED	TOTAL PADS	BLOOD CALCIUM MG. PER 100 C.C.
May 25	Entered hospital	6 subcut.	2' 30"	2'			10.07
May 26		18 "					
May 27		18 "					
May 28	Period began	12 "					
May 29		20 "					
May 30		20 "					
May 31		28 "					
June 1		18 "	2'	2'			10.64
June 2		15 "					
June 3	Stopped	10 "			7	21	

Total parathormone—165, all subcutaneous.

Rise in blood calcium—(after 122 units) 0.57 mg. per 100 c.c. blood.

*Remarks:* The patient used twenty-one of the small hospital pads, several of which were very slightly soiled. Since she usually used from twenty to twenty-nine large homemade pads, well soaked, we can conservatively estimate that she lost at this period less than one-half as much blood as at other periods.

Following the period just described the patient recovered her strength much more completely and quickly than she ever had done before. Her mother reported that her color was the best since she had first started to menstruate and that she had more vitality and energy during the intermenstrual periods than ever before.

TABLE V, CASE 4

DATE	NOTATION	THERAPY (UNITS)	CLOTTING TIME	BLEEDING TIME	DAYS LASTED	TOTAL PADS	BLOOD CALCIUM MG. PER 100 C.C.
June 21	Entered hospital	0					
June 22		0	2'	3'			10.56
June 23		6					
June 24		0					
June 25	Began to menstruate	15 subcut. 20 intrav.					
June 26		25 subcut.					
June 27		10 subcut. 20 intrav.					
June 28		15 intrav.					10.86
July 1	Stopped				7	18	

Total parathormone—111 units.

Rise in blood calcium—0.30 mg. per 100 c.c. of blood.

NOTE: In this protocol and in all of the others, units of hormone not definitely designated as given by intravenous injection were given subcutaneously.

*Remarks:* It is interesting to note that the blood calcium of this patient was almost as high at the beginning of this period as it was at the end of the last, and the clotting time was less at the beginning of this period than it was at the beginning of the previous one, before any of the extract had been given.

The patient believes that this period was better than the one of the month before, which was approximately one-half of her usual blood loss, although the blood calcium rise this time was less than that of the preceding period. Both the patient and her mother are quite convinced that the injections have helped her very much and that her physical condition has improved.

It is quite possible that the changes in the clotting and bleeding time following injection of the extract are not due in great part to the actual increase in the calcium content of the blood. The fact that the bleeding time may be reduced to one-half the normal without any appreciable increase in the calcium content of the plasma suggests the possibility that the extract may act by ionizing the calcium or in some other way activating it, thus hastening the formation of the clot.

Kylin<sup>2</sup> in making a study of the calcium content of blood serum of patients during menstruation found that the concentration of the blood calcium is normally elevated during the menstrual period. In complicating illnesses, as chronic urticaria (one case shown), the converse behavior was observed. The author reported an elevation of the blood calcium concentration of from 0.35 to 2.65 mg. per 100 c.c. during the menstrual period, with premenstrual values of 10.75 to 11.85. Six normal women and two more with complications (bronchitis, subacute and chronic urticaria) were the subjects of the study. It seems reasonable to assume that the contributory factors in the pathology of the cases we have studied may be explained on the basis of failure of the individual to exhibit the normal rise in blood calcium during the menstrual period.

It is possible, too, that the action of the calcium in diminishing the amount of blood lost at each period may be in part explained by the findings of Kylin and Nystrom,<sup>3</sup> that calcium injection causes, among other things, a rise in blood pressure, attributable to a vasoconstrictor action similar to that of adrenalin. In this way it may serve to some extent to constrict atonic, oozing vessels in the endometrium enough to promote the formation of a clot.

We realize that nothing is conclusively demonstrated by our work as here reported. Our most encouraging results are purely clinical ones, the interpretation of which depends, to a large extent, upon the intelligence of the patients. Fortunately all of the patients with whom we have worked have possessed more than the average mental capacity. Case 1 was a college graduate, while Case 3 was a teacher in a large university. The other two patients were quite alert, and all were capable of forming an intelligent opinion with regard to their own conditions.

In every instance the patients were encouraged by the results that were attendant upon the parathormone injections. All of them were convinced that their periods were shortened and that the actual blood loss was definitely less than at previous periods. All of them were of the opinion that the intermenstrual interval was characterized by a greater amount of strength, vitality, and energy than they had previously experienced.

The danger of producing a hyperealeemia is very small, even very large doses may be given. One hundred units of the parathormone is the amount which is said to increase the calcium content of a 20 kilo dog, 5 mg. per 100 c.c. of blood. Collip<sup>1</sup> describes hyperealeemia as a condition in which the blood calcium is greater than 15 mg. per 100 c.c. of blood. Assuming that the patient responds as does the experimental animal on a basis of weight, proportionately, more than 300 units would then be required in order to produce a hyperealeemia in a 60 kilo patient whose normal calcium content was 10 mg. or less per 100 c.c. of blood.

We realize that we are still dealing in theories and that the facts are yet to be demonstrated; but while we are not able to state definitely just what were the finer processes which followed the injections of the parathormone, to bring about the clinical results which we have reported, we have been encouraged enough by these results to continue the work with increased zeal.

While no definite conclusions can be formed at this time as to the permanent effect of the parathyroid extract upon such cases as those here described, we are inclined to conclude from our work thus far that the calcium content of the blood, following such doses of parathormone as we have used, does not show the rise reported by Kylin, but that—

1. The bleeding time and clotting time of the blood were definitely shortened.
2. The number of days of menstrual bleeding as well as the amount of blood lost was appreciably reduced.
3. During the intermenstrual period the patients were not so reduced in strength and vitality.

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We wish to express our thanks and appreciation to Dr. N. Sproat Heaney of Rush Medical College and to Dr. S. A. Matthews, Loyola University Medical School, for their advice and encouragement in the work which we have just described.

820 TOWER COURT.

# THE ORIGIN OF THE COMMON CYSTIC STRUCTURES OF THE HUMAN PLACENTA\*

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IN THE laboratory study of the placenta, including both gross and microscopic examination of anomalies and lesions, our attention was directed to the frequency of occurrence of small cystic structures in the placental tissue. Various types of cysts of the placenta have been recognized for some time, but the frequency with which this particular structure occurred arrested our attention, the gross picture being well defined and striking wherever the structure occurred.

Before proceeding further it would be well to take up a generalized gross description of the structures in question. The position is most frequently in the central portion of the placental area where the placental tissue is usually thickest. They are usually located somewhat nearer the fetal surface than the maternal surface. The size is quite variable. Most of the cavities are only a few millimeters in diameter, but in some cases the greatest diameter may exceed 2 cm. In placentae where the cysts are rather numerous the cavities are usually small in size.

The shape is quite irregular; seldom is it spherical. In many instances the cavities present diverticula which are greater in length than the diameter of the main portion of the cavity. The reason for the irregularity in shape will be evident when the microscopic picture is described.

On section of the fixed placenta the circumscribed outline is present. The wall is in most cases a very definite fibrin-like band, a millimeter or less in diameter, and it stands out distinctly from the surrounding tissue. The cavity is filled with a gelatinous opalescent material, sometimes quite clear, and sometimes with a sanguineous tinge. In some cases this material is quite firm, while again it may have the consistency of thin mucus.

The apparent relationship to the surrounding tissue is variable. In some cases the structures seem to be isolated in the villous tissue, again they appear to be in approximation to the chorionic membrane, and very frequently they are found to be in the terminal portion of septa contiguous with the decidua at the maternal surface. (Fig. 1.)

While attention was directed to the macroscopic cystic structures, microscopic cysts were being noted from time to time in sections taken from blocks of apparently normal placental tissue. These small cysts

\*Read at a meeting of the St. Louis Gynecological Society, May 14, 1926.

were of the same general appearance as the larger cysts and it was seen that the occurrence was invariably in the tissue constituting the so-called "decidual islands." These decidual islands are normal constituents of the placenta.

There is at present a controversy as to the origin of these decidual islands. Some observers maintain that they are of decidual origin and represent sections through decidual septa, while others take the view that these islands "represent masses of trophoblasts into which the chorionic connective tissue has not grown, and which therefore have not developed into typical villi." (J. W. Williams.)

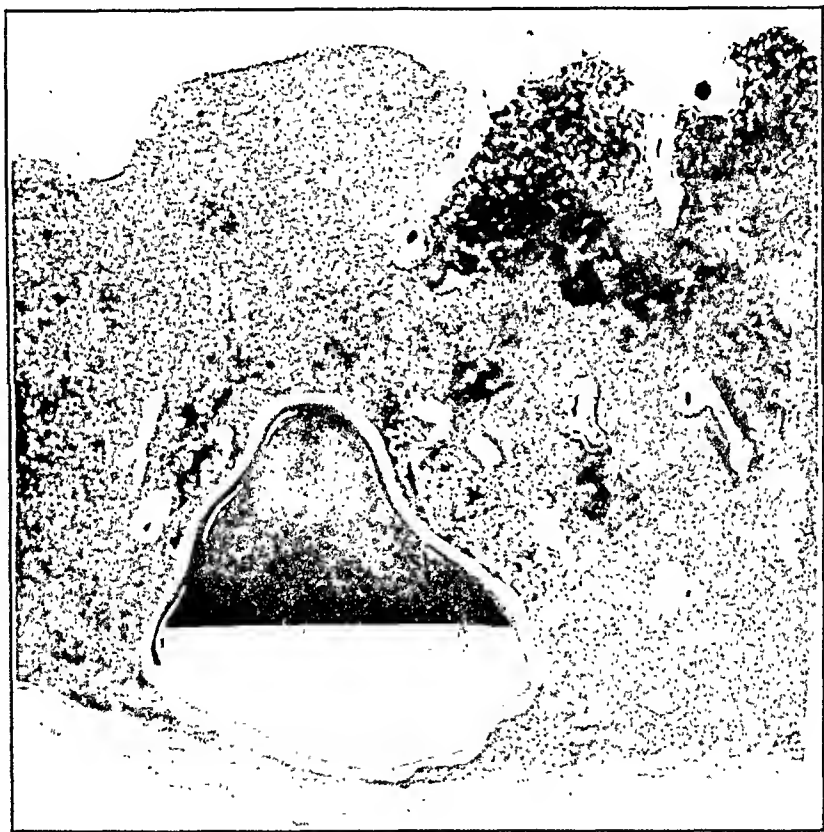


FIG. 1.—Gross section through the placenta showing a large cystic structure filled with gelatinous material and well circumscribed. Lower surface, fetal surface; maternal surface above. Enlarged one and a half times. Courtesy Drs. McNalley and Diekmann.

In order to determine in which tissues these cysts had their origin, repeated careful observations were made first in the gross tissue, and second, in the microscopic material. It was found almost invariably true that when repeated sections of the tissue containing the cysts were taken at intervals of a few millimeters, the cysts were found to be in septa of tissue contiguous with the decidual tissue at the maternal surface of the placenta.

Turning now to the microscopic picture presented on study of numerous sections through these cystic structures, we obtain a typical picture as follows: Projecting into, or surrounded by the villous

tissue of the placenta is seen an area of tissue markedly different in appearance. Separating this area from the surrounding villi is a pink-staining band of canalized fibrin, identical with the Nitabueh's fibrin layer at the junction between the fetal and maternal tissue. This fibrin layer may extend outward and surround adjacent villi and decidual tissue with the concurrent picture of white infarction in this area. Eden has pointed out that retrograde changes of decidual



Fig. 2.—Lab. No. 5900. Low power picture of placental section including a decidual septum contiguous with the decidua at the maternal surface. Near the terminal portion and central portion of septum the cystic changes are taking place. In the extreme left lower corner can be seen a portion of the so-called "decidual island," also undergoing degenerative change.

tissue in the placenta are of considerable importance in the white infarct formation.

Internal to the outer fibrinous band is usually a thicker layer of degenerating tissue. This depends greatly on the size of the entire structure and the age and advancement of the process. The tissue

takes a deeper stain with eosin and the cellular structure can be made out. In most cases this can be identified as degenerated or degenerating decidual tissue. In many cases where the cystic formation is only beginning in the central portion, this tissue is almost identical in appearance with the decidual tissue at the maternal surface. (Fig. 2.)

Internal to the decidual tissue and invading the decidual tissue is found another type of cell. These cells are larger, deeper staining cells than the decidual cells. They are epithelioid in appearance. They usually appear in groups or clumps. The nuclei are large and deep staining, the protoplasm is granular. In a number of sections two nuclei could be found in each of a number of cells. No mitotic figures were observed in any of the cell groups. They are well defined and in their groups intercellular spaces can be seen. Where



Fig. 3.—Lab. No. 5900. High magnification of a portion of the decdua at the maternal surface. In the center of the field are seen a number of deeper staining, well-defined cells,—the trophoblastic cells.

they invade the surrounding tissues they often seem to be in spaces giving the appearance of "cartilage cells." This latter appearance has been described at one time or another by various observers. We believe these cells to be of trophoblastic origin. They are not syncytial cells, as can readily be determined by their appearance and arrangement. These cells are identical with the cells found invading the decdua, other than the syncytial cells, throughout pregnancy. They are very similar to the other type of cell in chorioepithelioma, and are almost identical to the rapidly proliferating cells seen in the villi in cases of hydatid mole. They are most probably the same cells as Langhans' cells. (Figs. 3 and 4.)



On account of the similarity between the cells of the chorion and the decidual cells at term, there has been much confusion in regard to the origin and identity of many of the cells seen in some of the pathologic conditions. (Fig. 5.)

The deeper staining cells, which we believe to be of trophoblastic origin, are apparently quite invasive. Wherever they appear, either in the decidua proper or in these cystic septa, there is adjacent tissue destruction. This is probably the chief reason for the degenerated appearance of the tissues adjacent to them. By observing many sections containing the cystic formation in various stages of develop-



Fig. 4.—Lab. No. 5900. Higher magnification of the small "decidual island." Here the outer fibrin can be seen. Inside this is the degenerating decidua which has been invaded by the active deep staining cells in the central portion of the field. The central substance is beginning to be formed at the upper end of the cavity.

ment, it appears that these cells start at some region in the decidual septa and proliferate, digesting or liquefying the tissues before them. This process evidently starts rather early in the development of the placenta as we have been able to find such cystic structures in placenta as early as twenty weeks of gestation.

The cystic cavity is filled with the material described in the gross. This material takes a rather uniform light pink stain and is quite similar in appearance to the colloid found in the thyroid. It is rather

homogenous on superficial inspection. Previous observers have called attention to the appearance of colloid in the placenta. Although we have never found accurate descriptions of the entire structure as an entity, we have found references to material which was probably the material contained in the structures. This is also spoken of as "fibrin masses," "finely granular plasma masses," "liquefaction necrosis," and "hyalinization."

Although the general appearance of the substance is homogenous, closer inspection shows some variation in structure. Centrally it appears less dense, taking a somewhat lighter stain. Toward the margins small irregular-shaped masses of a trifle deeper staining reaction

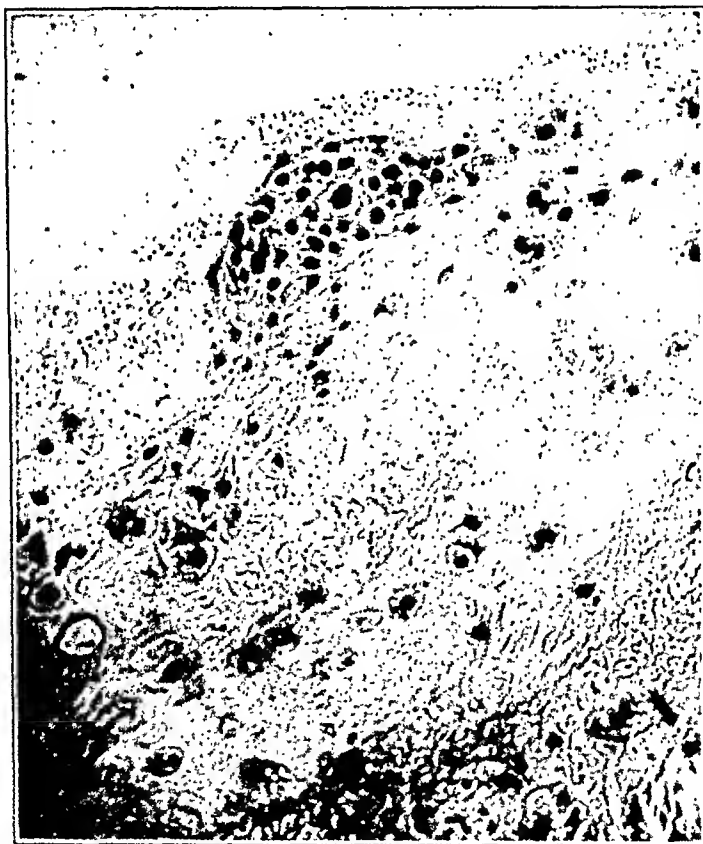


FIG. 5.—Lab. No. 6153. Section through wall of advanced cystic structure. Note group of trophoblastic cells in upper portion of the field, extending into the rather granular substance contained in the cavity. Beneath the cell group is the canalized fibrin containing a few trophoblastic cells and degenerating decidua cells. This outer fibrin layer in the lower portion of the field forms part of an adjacent white infarct.

are seen. Included in this central substance red blood cells are sometimes seen. Never have we found any nucleated red cells, as would be expected if these blood cells were of fetal origin. Again, some cellular debris may be seen, probably degenerating cells from the surrounding tissues. Figs. 4 and 5 show the appearance of the central material.

The question arises as to the composition of this material. One wonders whether it may be properly called colloid or hyaline. Owing

to its appearance, its staining quality with eosin, and its apparent production by the trophoblastic cells which are epithelial, we are inclined to believe that it may correctly be called colloid. With orcein and van Gieson's stain it also takes a light yellow-brown stain. We are at present working on the chemical and physiologic natures of this material. The results of this work may shed considerable light on the nature of the material.

There is much variation from this typical microscopic picture. The variation is undoubtedly due to the size of the decidual tissue in which the change takes place, to the age of the placenta, and to the degree of activity and number of the trophoblastic cells present. In many cases smaller portions of the decidual tissue show the least degree of invasion by the trophoblastic cells. It is usually true that the larger areas of decidual tissue show the cystic structure most distinctly. It is very unusual to find any comparatively large portions of decidual tissue in the placenta that do not show the trophoblastic invasion and definite cystic formation.

As the process goes on to the picture of an advanced stage the decidual cells may practically disappear, either forming a part of the canalized outer wall, or being digested to form the central gelatinous substance. This leaves the trophoblastic cells the only well-defined cell structures seen in the picture. These trophoblastic cells are also reduced in number by degeneration. The ultimate picture seen in a few cases in late placentas is a cystic structure with fibrinous walls containing a homogenous or very finely granular light pink-staining material.

Considerable difficulty is experienced in the preparation of microscopic sections due to the partial solubility of the gelatinous material in alcohol. There is considerable shrinkage with the partial precipitation of the more insoluble material about the walls of the cavity. This is especially true where rather advanced changes have taken place.

The frequency of the structure we have determined by going over a large series of placentas for the past several months. We have included those cases in which the structure was identified in the gross, or later on microscopic section alone. Wherever the structure appeared in the gross, sections were made for microscopic study. Our series includes 1965 placentas. In this series the structure was identified 290 times. The series included mainly full-term placentas, but quite a few premature placentas as well as placentas from miscarriages were obtained.

From the above figures it is seen that the frequency in our series was very nearly 14.1 per cent. We believe, however, that the structure is probably present in microscopic degree in nearly all cases. If almost any placenta is sectioned repeatedly, some sections will be

found to contain these areas of decidual tissue undergoing the changes we have described. It is probable that some factor in development determines the size and number of the areas.

The structures we have described are seen to be constituents in a rather large number of white infarcts. In fact, wherever these structures occur there is more or less adjacent white infarction. It would seem that these structures have a definite part in the process of white infarction. As we have previously mentioned, other observers have called attention to changes in decidual tissue constituting portions of white infarcts, and probably being of considerable importance in white infarct formation. Since marked white infarction and toxemia are so frequently associated, we have reviewed the cases in our series to see whether the occurrence of the cystic structures bears any association to maternal disease.

For this clinical review we have divided our series into two groups; namely, those in which the structures were seen in the gross as well as microscopically, and those in which the structures were found microscopically alone.

We have eliminated from the clinical study those cases in which the data were insufficient, except where definite pathologic conditions were known to exist. Especial attention has been paid to blood pressure, urine findings, physical findings, outstanding symptoms, and to the condition of the children during their stay in the hospital. The minor and transient complaints of the average patients have been disregarded. Since, in going into this survey we had no opinion on what the findings might be, we were able to tabulate the data without the influence of any preformed conclusions.

The accompanying tables (I and II) show the relationship between the number of cases with hypertension and albuminuria to the total numbers in each group, both in the primiparous and in the multiparous patients. The blood pressures were taken at the maximum before the onset of labor, and in most cases represent the values obtained in the dispensary or office some time during the course of prenatal care. The urine specimens were also taken some time before the onset of labor, usually during some prenatal visit.

From inspection of the tables it is seen that a rather large percentage of the cases observed ran a blood pressure over 130 some time during pregnancy. This point, however, is not outstanding and we do not feel that it should be emphasized.

Out of 231 cases in which the structure was identified in the gross and microscopically there were eight premature deliveries, eleven stillbirths, and five infant deaths. Out of 51 cases in which the microscopic structure alone was identified there was one abortion, three premature deliveries, two stillbirths, and two infant deaths. We do

TABLE I  
PRIMIPARAE

	BLOOD PRESSURE					TOTALS
	Under 130	130-140	140-160	160-180	180-200	
Albuminuria	45	21	11	2	1	80
	14	12	4	2	1	33
Cases in which structure was found microscopically only						
Albuminuria	8	4	0	0	0	12
	5	0	0	0	0	5

TABLE II  
MULTIPARAE

GRAVIDA	TOTALS	BLOOD PRESSURE					ALB. IN URINE
		Under 130	130-140	140-160	160-180	180-200+	
II.	37	20	9	6	2	0	8
Micro alone	11	8	1	1	0	1	3
III.	22	10	8	3	1	0	3
Micro alone	6	4	2	0	0	0	1
IV.	12	8	2	1	1	0	6
Micro alone	2	2	0	0	0	0	1
V.	5	2	2	1	0	0	1
Micro alone	3	1	0	2	0	0	0
VI.	7	6	1	0	0	0	0
Micro alone	5	3	1	0	0	1	1
VII.	2	1	0	1	0	0	0
Micro alone	3	1	1	0	1	0	3
VIII.	2	0	0	0	0	0	2
Micro alone	0	0	0	0	0	0	0
IX.	2	2	0	0	0	0	0
Micro alone	0	0	0	0	0	0	0
X.	4	1	1	1	0	1	1
Micro alone	0	0	0	0	0	0	0
XII.	1	1	0	0	0	0	0
Micro alone	1	0	0	1	0	0	1
XIV.	0	0	0	0	0	0	0
Micro alone	1	1	0	0	0	0	0
XVIII.	0	0	0	0	0	0	0
Micro alone	1	0	0	1	0	0	1

not feel that these are particularly significant figures, for many cases from which we obtained placentas were sent into the hospital because of complications of pregnancy or labor.

In order to make the study complete we present the important maternal abnormalities occurring in our series. They are as follows:

- 36 Cases showing enlargement of the thyroid. One had previous thyroidectomy.
- 4 Cases of tuberculosis, chronic.
- 1 Case of tuberculosis, acute.
- 8 Toxemias: 1 eclampsia; 4 preeclamptic toxemias, and 3 other toxemias not classified.
- 1 Peritonitis with pregnancy.
- 1 Hysteria with pregnancy.
- 1 Pyelitis.
- 2 Cases of myocarditis, chronic.
- 3 Cases of hydramnios.
- 1 Placenta previa.
- 1 Acute appendix.
- 1 Diabetic.
- 1 Vomiting of pregnancy.
- 12 Syphilitic mothers.

It is seen that the above list includes a diversity of conditions, none of which probably have origin in the structure under consideration.

#### CONCLUSIONS

From our study of this series of cases we arrive at the following conclusions:

1. The so-called decidual islands of the placenta are maternal in origin and are portions of decidual septa.
2. The cystic structures that we have described have their origin in decidual tissue and are formed by the action of trophoblastic cells on decidual tissue.
3. These structures are always associated with some degree of white infarction, and are in all probability the cause of the white infarcts with which they are associated.

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# CARCINOMA OF THE CERVIX UTERI, A CLINICAL AND PATHOLOGIC STUDY

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MICROSCOPIC examination of malignant tumors of the cervix has revealed certain well defined variations and there have been many classifications evolved on this basis. None, however, are totally satisfactory, as the exact relation of the various groups with the clinical phenomena has not been fully established. Many data have been published relating to the importance of this work in its application to the treatment with radium and x-ray, but the lack of uniformity in results and the absence of a standard classification show the need for further study. The following paper represents an attempt to analyze the histopathologic findings in a series of cancer of the cervix and to correlate them with certain clinical features present.

It is regrettable that there should be so much confusion in the literature regarding the terminology in the various types of carcinoma of the cervix uteri. There is great variance both in the appellation and in the number of methods of grouping in vogue. Not only are these means different when evolved on separate grounds, such as tissue of origin, general arrangement of tumor, etc., but even classifications supposedly on the same basis show marked differences. Recent studies suggest that the most practical way to classify cancer of the cervix from its microscopic appearance is to use the individual cell itself as a point of departure. This method does not consider the actual origin of the cell—whether it be from squamous or cylindrical celled epithelium (a differentiation that may be very difficult indeed to establish), but is based purely on its morphologic appearance. Even this is not without its disadvantages, for not only must the individual tumor cell be studied but certain of its local and general tissue relations necessarily are forced into consideration. In this study an adaptation of the excellent classification evolved by Schottlaender and Kermanner<sup>1</sup> and now in general usage in the German literature and adopted in one form or another by many American writers, has been employed. The cases of cervical cancer have been divided into two main groups, (A) adenomatous, and (B) solid. The solid again have been subdivided into: (a) ripe, (b) midripe, (c) unripe. The actual terms employed in the subdivision are rather unfortunate, implying as they do an embryologic process, but they have been kept rather than suggest any addition to an already overburdened terminology.

Solid tumors have been designated as ripe where the general appearance of the tissue shows a well defined resemblance to normal squamous epithelium, when prickle-cells are present and there is definite evidence of cornification (Fig. 1). The unripe, or immature, cancers of the cervix represent the largest group. In this type of tumor, the cells show no resemblance to any tissue of origin; the cell outlines cannot be clearly made out; the nuclei show great variation in both size and shape, although they are generally small and oval, round or spindle shaped; they are rich in chromatin and stain very deeply with hematoxylin; cornification is very rare; and in their general arrangement the cells are in nests, bands or diffusely scattered

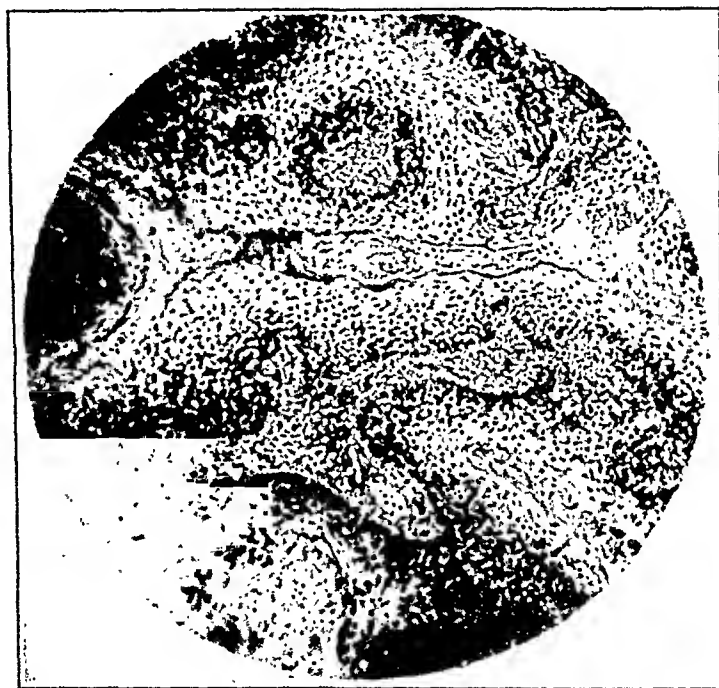


Fig. 1.—(Spec. No. 8592.) Mature type of cancer of the cervix uteri. Low power.

(Fig. 2). The midripe tumors occupy a position halfway between the other two forms and in this group necessarily fall a large number of tumors which do not show a sufficiently mature appearance to be classed as ripe, and also those which show such uniformity and high development of cells as to be considered a more mature type than the unripe. The characteristic appearance of this tumor, however, is said to show cells typically polygonal in shape and fairly regular in size, the outlines are visible, the cytoplasm is pale staining, while the nuclei also do not stain as deeply as in the unripe variety and cornification may or may not be present (Fig. 3).

In the adenomatous group have been placed those tumors showing definite glandular formations as the main feature of the cancer and eliminating those forms of unripe tumors which represent degenera-



tive processes and are designated by some writers as "adenoid" and "cystic." No case of true "adenoma malignum," or, as suggested by Spencer,<sup>1</sup> "carcinoma adenomatodes," was noted. Owing to the small number of cases in this series no further differentiation was used, although the classification described by Frankl and Kraul,<sup>3</sup> who subdivide their cases into ripe, midripe and unripe according to the development of the glands and the amount of epithelial proliferation, is worthy of consideration.

The actual study and classification of individual tumors is not altogether easy and many forms are very difficult to classify satisfactorily but the vast majority will be found to fall into one or other of the

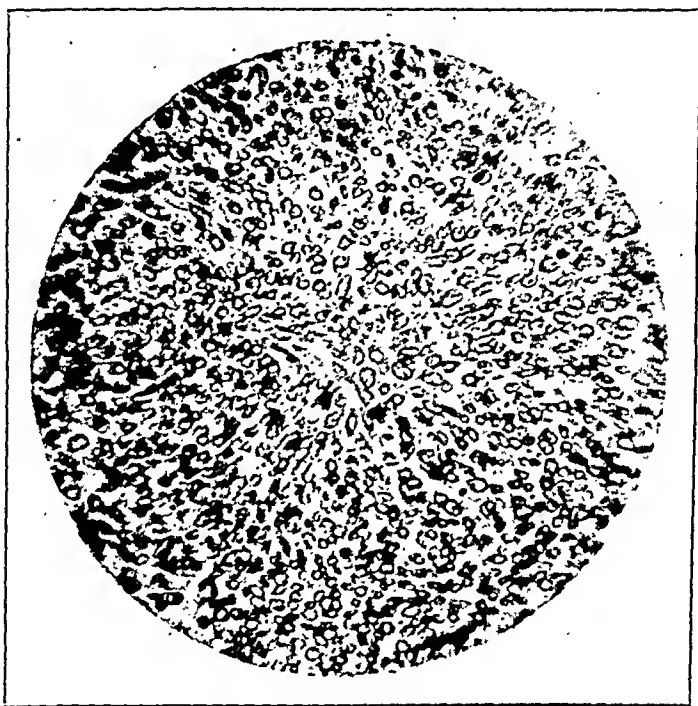


Fig. 2.—(Spec. No. 8831.) Cancer cells of "unripe" type. High power.

above mentioned groups. Biopsy specimens at times are so small that although a diagnosis of cancer is established, its classification may be impossible. Then too, the mixed forms, to be described in detail below, may offer difficulties and lead to faulty classification. However, although the error is quite possible, it is not likely to occur frequently as in this study where a total specimen of the uterus or repeated biopsies were available it was found that even in the mixed tumors one type of cancer cell definitely predominated.

The material studied was obtained from a series of 110 patients with carcinoma of the cervix who presented themselves for treatment at the Stanford Clinic during the past ten years. These have been taken consecutively, eliminating only those in whom clinical

data was lacking or the pathologic material was insufficient or unsuitable. Twenty-three patients had had hysterectomy and consequently sections from various parts of the uterine were available for study. The remainder were biopsy specimens but in thirteen cases there were two or more taken at different stages of the disease. No specimens taken after cauterization, radium or x-ray exposure were used in the grouping of the cases.

Of the 110 specimens studied, it has been found that 6 or 5.4 per cent were of the adenomatous type and 104 or 94.6 per cent were

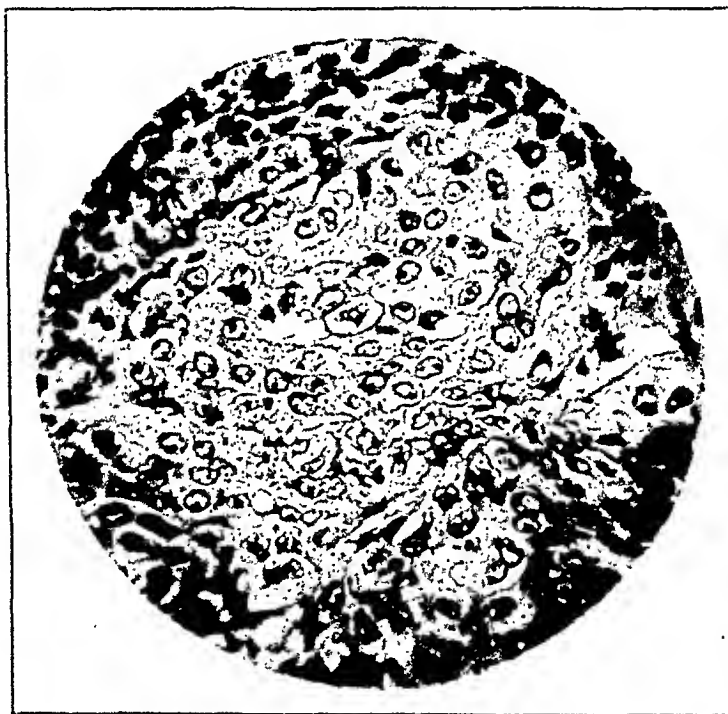


FIG. 3.—(Spec. No. A-185.) "Midripe" cells in cancer of the cervix uteri. High power.

solid cancers. The solid, again, showed the following incidence as compared with figures cited by certain German writers:

TABLE I

	NUMBER OF CASES	RIPE	PER CENT MIDRIPE	UNRIPE
Stanford Clinic	101	21.0	29.8	46.2
Schottlander and Kermanner	115	10.5	42.1	47.4
Ballin <sup>2</sup>	385	19.8	39.5	40.5
Fraukl and Kraus	1002	7.5	27.5	65.0

The occurrence of cornification, with or without completely developed "cancer pearls," was noted in all the ripe cases, and in 17 or 54.8 per cent of the midripe. It has thus been considered as an evidence of maturity, although this is not infallible, as two sections

of a definitely immature tumor showed pearl formation. This fact has been noted before by Adler,<sup>6</sup> and Krompecher<sup>2</sup> in his monograph on *Basal-cell Carcinoma of the Uterus*, remarks on five cases of basal-celled carcinoma with pearls (in a series of 216) to which he gives the name of "Parakeratotic."

Attention was paid especially to "mixed tumors," that is, specimens in which indubitable groups of cells of different maturity were found in the same specimen. The importance of this in regard to the possibility of a faulty diagnosis in examining biopsy sections and also in determining radium dosage has been mentioned many times before, among others by Schottlaender and Kermanner,<sup>1</sup> Schmitz,<sup>7</sup> Klemperer,<sup>10</sup> and Adler.<sup>6</sup> Martzloff,<sup>11, 12</sup> although using a slightly different classification, found mixed forms occurring in 129 cases in a series of 387 patients. Thirty-five or 32.1 per cent of the sections in this series showed the presence of mixed forms, as follows:

Ripe—with unripe areas with midripe areas	2 1	{ 12% of ripe tumors
Midripe—with unripe areas with ripe areas	4 5	
Unripe—with midripe areas with ripe areas	13 2	{ 38.7% of midripe tumors
with both ripe and mid- ripe areas	4	
Adenomatous with unripe nests	2	{ 39.5% of unripe tumors

Only the cases which showed very definite areas or nests of different maturity were used in this classification. A few presented some difficulty as to which group they belonged but in the vast majority of the cases, one type of cell very definitely predominated. The adenomatous tumors noted with unripe areas would supposedly have been classed by Schottlaender and Kermanner as "primary glandular, secondary solid," and by Frankl and Kraul as "unripe adenocarcinoma."

Leucocyte infiltration, composed of lymphocytes, polymorphonuclear leucocytes and plasma cells, was noted in varying degrees in all cases with the exception of two mature cancers and three midripe. Mitotic figures were not analyzed in detail, but it is interesting to note that Palugyay<sup>13</sup> recently found that the histologic division of cancer of the cervix according to maturity is borne out in cytologic studies. Owing to the importance attributed by Lahm<sup>14, 15</sup> to the presence of eosinophiles in establishing a prognosis in radium treatment, special attention was paid to their occurrence. They were noted in very small numbers in eighteen cases and to a greater extent in eight others. In thirteen or 11.9 per cent of the specimens, however, (ripe 3, midripe 4, and unripe 6) they were present in excessive

numbers (Fig. 4), and could be found not only throughout the connective tissues but also among the individual cancer cells.

Several writers, notably Schottlaender and Kermanner,<sup>1</sup> Ballin<sup>2</sup> and Frankl and Kraul<sup>3</sup> have found in their series that the riper types of cancer of the cervix were present more frequently in the older patients and the immature in the earlier years. It has also been stated that adenocarcinoma occurs more often later in life. The findings of this series are charted in Table II and it will be seen that the figures do not bear out the above conception. The greatest incidence for all types was observed to be between forty and fifty years of age, with 39.1 per cent of cases falling in this group and the next



Fig. 4.—(Spec. No. A-185.) Marked infiltration with eosinophilic cells. "Mildripe" type of cancer cells. High power.

decade ranking second with 22.7 per cent. In studying the figures for the groups of different maturity, it will be found that they each more or less coincide with the totals for the whole series and the mature forms far from being less prevalent show a slightly greater percentage in the earlier years than either of the other two solid cancers. Owing to the few adenocarcinomata in the series, it is felt that no conclusions can be drawn from them.

In order to determine to what stage the disease had progressed when patients were first seen, they were classified from the clinical examinations according to the five groups of Schmitz' classification, namely:

- I. Disease limited to the cervix.
- II. Doubtful, but probably limited to the cervix.
- III. Involvement of vaginal walls or parametria.
- IV. Hopelessly advanced cases.
- V. Cancer in the stump of the cervix following previous supravaginal hysterectomy.

The terms "operable" and "inoperable" have been avoided as they are not truly descriptive and the conditions present may vary according to the individual examiner's conceptions of what constitutes an operable or inoperable case.

TABLE II  
AGE INCIDENCE

AGE	RIPE		MIDRIPE		UNRIPE		ADENOMATOUS		TOTAL	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
20-30	0		0		1	2.1	0		1	0.9
30-40	6	24	4	12.8	10	20.8	2	33.35	22	20.0
40-50	11	44	11	35.5	19	39.6	2	33.35	43	39.1
50-60	6	24	6	19.4	12	25.0	1	16.65	25	22.7
60-70	2	8	9	29.0	6	12.5	1	16.65	18	16.4
70-80	0		1	3.3	0		0		1	0.9

It was then found (see Table III) that 31 patients, namely, 28.1 per cent, belonged to Groups I and II and the balance, namely, 79 or 71.9 per cent were advanced cases. Of the former there were: ripe, 8 cases or 32 per cent; midripe, 9 cases or 29 per cent; and unripe, 11 cases or 22.9 per cent, which showed that on admission the disease was limited to the cervix, thus showing a definite superiority in the case of the maturer forms. This per se cannot be taken as definite evidence that the mature forms are less malignant than the other types as there are other factors which must come into consideration, among which duration of the disease is of the utmost importance. However, in a comparatively long series of cases these factors tend to more or less balance one another and so if any one group should present a larger proportion of early cases than the others this fact may be considered as an important piece of evidence that it is slower-growing and less malignant. If so, then the above study tends to show that the immature types of cancer of the cervix are more malignant than the mature forms, a conception held by many writers (Schottlaender and Kermauner,<sup>1</sup> Frankl and Kraul,<sup>3</sup> Schmitz,<sup>7</sup> Ward and Farrar,<sup>16</sup> Martzloff<sup>11, 12</sup>).

TABLE III  
EXTENT OF DISEASE ON ADMISSION

	RIPE		MIDRIPE		UNRIPE		ADENOMATOUS		TOTAL	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
Limited to cervix	8	32	9	29	11	22.9	3	50	31	28.1
Advanced	17	68	22	71	37	77.1	3	50	79	71.9

From its clinical appearance cancer of the cervix may be described as having three manifestations (Ewing<sup>17</sup>). The first, characterized by an excavated ulceration, is the most common, and was found to occur in 51.9 per cent of the 102 cases of this series for which a complete description of the clinical aspect was obtainable. The second form, in which there is extensive induration and swelling of the cervix, was present in 22.6 per cent of the total. The third type, which exhibits papillary or cauliflower outgrowths, occurred in 25.5 per cent of the patients. Table IV shows the occurrence of these lesions in the different pathologic groups, and it is at once apparent that there is no relation between the two. Each of the pathologic groups is represented in the three clinical divisions in about the same ratio as the figures quoted above for the total, with the single exception that none of the adenomatous tumors showed cauliflower outgrowths. Thus it can be definitely stated that in the histopathologic classification of carcinoma of the cervix uteri there is nothing distinctive in regard to its clinical appearance. From the examination of a patient it is impossible to estimate what the microscopic picture will demonstrate.

TABLE IV  
CLINICAL ASPECTS OF TUMOR

	RHE		MIDRHE		UNRHE		ADENOMATOES		TOTAL	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
Ulceration	12	52.2	17	56.7	19	44.2	5	88.3	53	51.9
Induration	5	21.7	8	26.7	9	20.9	1	16.7	23	22.6
Cauliflower	6	26.1	5	16.6	15	34.9	0		26	25.5
Total cases	23		30		43		6		102	

A series of charts were drawn up in an attempt to establish some relation between the duration of symptoms and the extent of the disease in each of the groups. The patients were divided into eight sections, according to the length of time during which they had had manifestations of the disease prior to admission. Figures regarding duration of symptoms for the early and for the advanced cases were obtained in each of the pathologic groups. It was hoped that some conclusions could be obtained particularly from the group of early cases since they could be considered as representing the disease at about the same stage. The figures point to but one conclusion, namely, that the extent of the disease cannot possibly be estimated by the period during which the patient has had symptoms, and that applies to any or all of the pathologic groups. There is no way of telling at what stage of the disease symptoms will appear. To account for the great disparity sometimes seen it seems likely that the rate of growth in these tumors, even when they present either a similar clinical appearance or a similar histopathologic picture, must vary in different individuals.

As stated in the introduction to this paper, the practical importance of classifying carcinoma of the cervix according to the predominating type of cell is in regard to its treatment with radium. The majority of writers among whom may be mentioned Schmitz,<sup>7, 9</sup> Alter,<sup>18, 19</sup> Ward and Farrar,<sup>19</sup> and Böhm and Zweifel,<sup>20</sup> are in accord that this type of tumor follows the law of Bergonier and Tribondeau, that is, that the more immature the cell the greater is its sensitiveness to the action of rays. However, this view is still controversial and has met with opposition. W. Lahm<sup>14</sup> while stating that the radiosensibility of the cells of cancer of the cervix grouped according to maturity varies, advises the use of higher dosage in the unripe forms. Adler<sup>6</sup> found that the poorest results were obtained in the adenocarcinomata and the most favorable with the fully mature solid types. It is worth noting, however, that the series Adler reports includes not only cancer of the cervix but all forms of cancer occurring in the pelvis, and he does not differentiate his cases according to the extent of the disease. It would seem to be of the utmost importance to do this since in considering a large group so many in advanced stages are of the unripe variety. Pomeroy and Strauss<sup>21</sup> reporting a series of one hundred cases, believe that the adenocarcinomata and the solid "spinal cell type with pearls" which apparently are maturer forms, give better results with radium.

In the present series, somewhat less than half of the cases have been treated with radium and present sufficiently complete histories to use in this regard. It is felt, therefore, that the number is too small from which to draw positive conclusions. However, analysis points definitely in one direction and they are briefly mentioned here as a matter of record. Seventeen of the cases showed the disease limited to the cervix as follows: adenomatous, two; ripe, six; midripe, three; unripe, six. Of these, eleven cases were found alive and free from disease at periods varying from one to nine years after treatment. The balance have either died or showed evidence of carcinoma on examination several months later. Of the ripe variety, only two are well, the other four showing disease extended; of the midripe, two are well; of the unripe, all are free from any evidence of recurrence, while of the adenomatous, one is well. With the advanced cases, very discouraging results have been obtained in each group, but the patients having immature types of cancer cells seem to have a longer life and to be free of symptoms for longer periods than the mature forms. This evidence is taken to support the conception that the radiosensibility of the unripe cancer cells is greater than the ripe.

Of all the patients treated with radium, eight showed marked eosinophilia in pathologic sections. Five of these were in patients who were found free of symptoms following radium treatment at thirteen months, three and one-half years, four years, five years and nine years

respectively. The other three cases, however, did very badly. The presence of large numbers of eosinophiles, especially in the unripe cancers of the cervix, may be a favorable sign in the prognosis during treatment by radiation, but further evidence is essential.

#### SUMMARY

1. A series of 110 cases of carcinoma of the cervix uteri have been studied.

2. On histopathologic examination of operative and biopsy specimens they were classified into two main groups: (A) adenomatous, and (B) solid. The solid were subdivided according to the predominating type of cancer cell into (a) ripe, (b) midripe, and (c) unripe.

3. Adenomatous tumors represented 5.4 per cent of the total, and 94.6 per cent were solid. Of these, 24 per cent were of the ripe, 29.8 per cent of the midripe and 46.2 per cent of the unripe varieties.

4. Cornification occurred in all the ripe tumors and in 54.8 per cent of the midripe, but in only two of the unripe.

5. Mixed tumors were found in 32.1 per cent of the cases in this series.

6. Eosinophilia was present to a marked degree in 11.9 per cent of the sections examined.

7. No relation between the age of the patient and the type of tumor could be established.

8. The disease was limited to the cervix in 28.1 per cent of cases.

9. A larger proportion of cases found in the early stages at first examination were of the ripe variety than of any other group.

10. The typical appearance of cancer of the cervix on clinical examination is either (a) ulceration, (b) induration, or (c) cauliflower-like outgrowth.

11. There is no relation between the clinical appearance of carcinoma of the cervix uteri and the histopathologic groups.

12. It is impossible to determine the extent and duration of the disease from the length of time that symptoms have been present.

13. The radiosensitivity of the different pathologic groups is still controversial. Evidence is given supporting the conception that the immature forms do better with radium.

14. The presence of large numbers of eosinophiles in microscopic sections of carcinoma of the cervix may be a favorable prognostic sign when treatment with radium is employed.

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## INIENECEPHALUS, WITH THE REPORT OF A CASE

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FETAL monstrosities are always a source of scientific curiosity, but when they tend to modify the course of labor, they assume practical import the gravity of which varies with the degree of dystocia produced.

For this reason, we take the liberty of reporting a case of inienecephalus, which not only occupies the position of being a very rare type of monster, but also presented itself as a complicated problem when delivery was attempted and effected.

Inienecephalus, or fetus retroflexus, is a very rare condition, having been first definitely described by Saint-Hilaire in 1836, at which time only three cases had been reported. Lewis, in 1897, reviewed twenty-five cases collected from the literature. Ballantyne, in his "Manual" published in 1904, records seven cases. In 1925 Dorland reviewed the literature recording ten additional cases; Burton (1897); Hirst (1897); Abbot and Lockhart (1905) three; Hunziker (1911); Vollois (1914); Wheeler (1918); Michel (1919); and Hayes (1922); to which he added one case of his own and two others present in Chicago, making a total of 38 cases.

Inienecephalus is generally grouped by Sehwalbe and others, in the class of rhaehischises; characterized by a fissuring of the spinal column. There are three cardinal features of this type of deformity:

1. Backward displacement of the head and a posterior bending of the spinal column.

2. Varying degree of spina bifida affecting the upper spine.

3. Defect in the posterior portion of the skull in the region of the foramen magnum.

Commonly there is a cleavage of the occipital region of the skull and fusion of the exoccipitalis with the vertebrae. The neural arches are united to a varying degree (Fig. 4). Hayes called attention to the fact that the brain is displaced downwards, due to a shortening of the craniovertebral axis with the formation of a straight line from the nasal septum to the sacrum. The neural arches of the vertebrae are deficient, failing to unite posterior to the spinal cord. The vertebral column is shortened, due to failure in separation of the cervical and thoracic vertebrae.



FIG. 1.—Dorsal view—head dissected from back, showing defect of cervical vertebrae.



FIG. 2.—Lateral view—umbilical hernia.

As to the etiologic factors at work in the production of this condition, nothing is known. Hydrocephalus and hydrorachis were the causes given by the older authorities. Following the report of Abbot and Lockhart, the amniotic fluid theory gained prominence. According to the theory of Hayes, there is a developmental arrest during an embryonic state in which there is a dorsal concavity in the vertebral axis,—in itself regarded as an abnormality. Bartelmez advances Child's theory of development as follows. The regions of an embryo which are most active at any given time are the most susceptible to injury. In cases of inienecephalus and spina bifida everything de-

velops normally, except that the brain ventricles and spinal column remain in communication with the amniotic cavity; the degeneration of the central nervous system being due to maceration of the liquor amnii. Skeletal defects are due to the lining of the central nervous system remaining in communication with the outer skin. Neural defects are due to failure of the neural folds to close.

*Case Report.*—Mrs. M. R., aged forty-three, Polish, para, xi. Husband in good health. Seven deliveries instrumental, three deliveries normal. Eight children living and well. One child died when seven days old, one at seven months.



Fig. 3.—X-ray—lateral view.

Called to the home of the patient by Dr. C. S. R., because he was unable to deliver her. Patient was found lying in a pool of blood in bed, almost exsanguinated, with a pulse of 132 and a temperature of 100°. The uterus was the size of a full term pregnancy, no heart sounds being obtained. Both feet and lower legs were dangling out of the introitus. Due to her condition the patient was immediately sent to the hospital. On vaginal examination the vagina was found to be large, cervix effaced, and the legs extending out of the os externum; the fetal sacrum faced anteriorly and attached just above it to the back was a tumor mass the size of a child's head which was thought to be a teratoma. With the fingers of the left hand an attempt was made to dissect this tumor free from the fetal body while

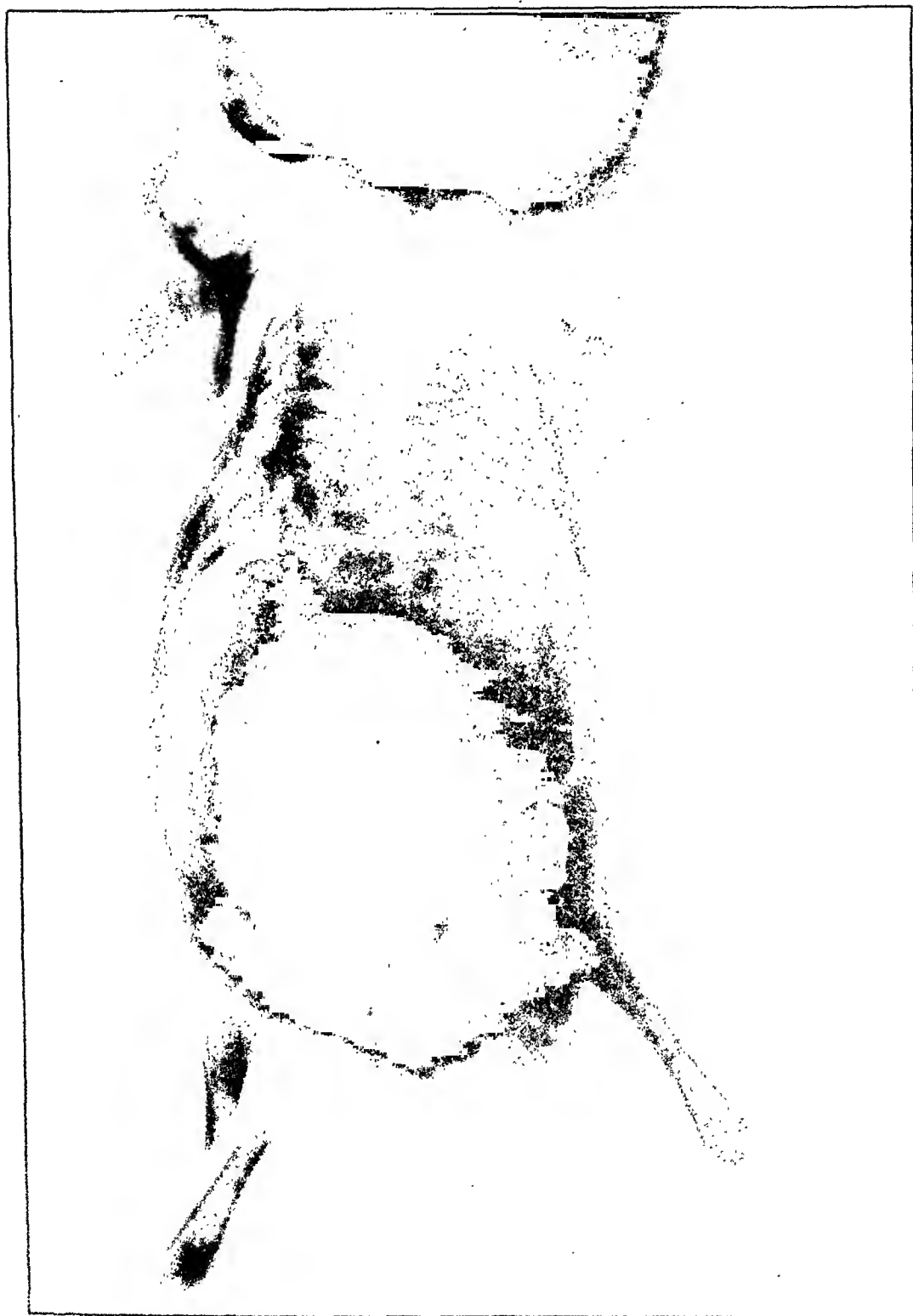


FIG. 1.—X-ray—dorsal view.

traction on the extremities was made with the right hand. Suddenly, something gave way and the extraction occurred very rapidly. It was at first thought that the uterus had been ruptured, but as the back came to view it was seen that the tearing was due to loosening of the skin and fascia which held the head of the child in extreme retroflexion. Delivery of a stillborn fetus was then easily effected.

The mother was given saline by hypodermoclysis before and after delivery. Recovery occurred in eleven days, after slight sepsis. The antepartum hemorrhage was due to partial separation of the placenta during the efforts made at home to do a breech extraction.

*Description of Fetus.*—Female at term, stillborn. Weight, 7 pounds 5 ounces. Length 49 centimeters. Head markedly retroflexed with the occiput attached to the dorsum (Fig. 2). Face looks upward and slightly oblique and to the left. Features and facial structures normal. The trunk exhibits a marked dorsal concavity. There is no distinct neck, the head tending to merge with the shoulders and back. There is failure in development of the cervical vertebrae with failure of union of the vertebral arches. There is a marked umbilical hernia measuring 6.5x5x3 cm. (Fig. 2). The extremities are normal. (The fracture of the left femur occurred from forcible traction during attempt at delivery at home.) Distance from anus to point of attachment of head to dorsum is 9 cm. Thoracic structures were normal. The fetus had bilateral polycystic kidneys.

#### OBSTETRICAL IMPORTANCE

A case of this nature represents not only a problem in diagnosis, but also one in management during labor. The question of proper procedure at once comes to mind. With an improper diagnosis, as in this case, the procedure must be guided by the existing conditions. With the same abnormality of fetus and a vertex instead of breech presentation and failure of engagement to take place, various procedures would be thought of, varying from podalic version to cesarean section; if proper diagnosis had not been made. With a small fetus spontaneous delivery is possible; but where the fetus is at term operative procedure is indicated. An early diagnosis must be made in these cases to insure proper procedure; and if not made, interference is guided by the conditions as they arise.

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# HYDATIDIFORM MOLE COMPLICATED BY PERFORATION OF THE UTERINE WALL AND SECONDARY CHORIO-EPITHELIOMA OF THE PELVIS\*

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THE clinical report embodied in the title of this paper concerns probably the most frequent, as well as the most serious pathologic alteration of the ovular envelope. It has long been recognized that an apparently benign mole may occasionally assume a malignant propensity, erode the endometrium, invade the myometrium and finally, perforate the peritoneal investment of the uterine body. In a certain number of cases an even more serious condition may ultimately result, the tumor assuming a degree of malignancy which challenges all other types of malignant growths. The tumor described in this case report portrays consecutively the three pathologic aspects which this neoplasm sometimes assumes, namely: First, a simple, histologically benign growth, second, a perforating uterine tumor, and third, an exceedingly fatal type of malignant chorioepithelioma.

*Historical.*—According to Williams, this peculiar alteration in the embryonal sheath was first described by Von Graefenberg in 1565. Aetius von Amodea, according to Kossman, wrote intelligently of hydatidiform mole in the early part of the sixth century, though he did not have a clear, if any, conception of the pathologic nature of the condition. Various theories regarding the character of the trouble were propounded by early writers. Some regarded the vesicles as identical with the ordinary echinococcus or hyatid cysts. Others looked upon the cystic bodies as mature ova, while still others believed they represented evidence of multiple pregnancy. Williams refers to the case of the Countess Hagenau, who, it was believed, gave birth to three hundred and sixty-five embryos at a single labor. These were obviously simple hydatidiform cysts. It was not until the beginning of the nineteenth century that the lesion was finally recognized as a cystic degeneration of the placental villi.

*Frequency of Hydatidiform Mole.*—With regard to the frequency of simple benign hydatidiform mole, there is a wide gap in statistical figures. Accurate statistics respecting its incidence are not forthcoming, but modern writers believe the condition occurs with much greater frequency than taught by their predecessors. The earlier authors fixed the percentage as one in twenty thousand pregnancies, but later investigators report a percentage as high as one in two hundred, while still others assert that the complication arises in seventy-five per cent of all abortions.

Madame Boivin, in 1827, one hundred years ago, and to whom nearly all authors refer, stated the condition arose once in twenty thousand pregnancies.

Kross refers to the work of Freund who likewise set the percentage at one in twenty thousand pregnancies.

\*Read at a meeting of the Philadelphia Obstetrical Society, May 6, 1926.

Broadhead and Kasseholm, in a study of 12,030 cases of labor and abortion from January, 1914, to November, 1921, found six hydatidiform moles, or one in two thousand.

Findley, in an analysis of five hundred cases of hydatidiform mole, believes the incidence of clinically frank cases is about one in 728 to one in 1000. This writer states the condition is probably more frequent, though accurate statistics, he claims, are not available, because only complicated moles are reported, as a rule.

Gordon, in a study of 4500 abortions in the Bellevue Hospital, New York, found twenty-one cases of hydatidiform mole or one in two hundred and fourteen. In a series of 348 pathologic abortions this writer found hydatidiform degeneration in 43 per cent.

Velasco in 8187 maternity patients found forty typical examples of hydatidiform mole or one in 204 cases (5 per cent).

Storeh, quoted by Frank, in an examination of a large series of unselected abortive ova found that 75 per cent showed hydatidiform degeneration.

*A perusal of recent literature indicates there is a growing conviction that the condition is more frequent than heretofore believed.*

Meyer, in an analysis of 2589 abortions in the Mall collection, found, on gross examination alone, eight cases of mole or one in 261 cases. After a careful microscopic study, he reached the conclusion that the percentage was even greater. In a study of 104 tubal pregnancies, he found hydatidiform mole in 46 per cent (quoted by Payne). Meyer believes from 4 to 10 per cent of all early pregnancies are complicated by some degree of hydatidiform degeneration. He claims the determination of the frequency of this condition depends on the care with which all specimens are examined.

*Frequency of Uterine Perforation and Rupture.*—While most authors mention uterine perforation with rupture as one of the possible complications of hydatidiform mole, only a few report observation of personal cases. Probably this culmination of the trouble is more frequent than a study of the literature indicates.

From January, 1921, to January, 1925, inclusive, I found the case reports of sixty-eight moles. Of this number there were five cases of perforation with simultaneous bursting of the uterine wall. This would indicate that perforation may occur in one of every twelve cases, though from the relatively large number of cases of simple moles observed, it is obvious that uterine perforation is not a frequent complication. The figures just mentioned regarding this feature of the trouble certainly could not be regarded as sound criteria of the frequency of perforation or rupture. It is equally obvious, however, that spontaneous rupture complicating hydatidiform mole is a real danger; due, first, to the extraordinary and rapid enlargement of the uterus and second, to hydatid infiltration of the myometrium.

The five cases of perforation with rupture recorded from 1921 to 1925 were reported by Krellenstein, who reviewed the literature of all recorded cases of hydatidiform rupture of the uterus from 1904 to 1924. This series included a personal case of Krellenstein.

*Hydatidiform Mole and Chorioepithelioma.*—A voluminous literature has arisen regarding the etiologic relationship of hydatidiform mole

and chorion epithelioma. This has developed since Sanger, in 1889, first drew attention to this unusual malignant degeneration of the placenta.

Special interest in chorion epithelioma is displayed by numerous writers and up until 1921 there were recorded in the literature 587 cases. In the quarterly accumulative index for 1921 to 1924 inclusive, I found twenty-five additional cases recorded, making to date, a total of 612 cases.

It has long been known that hydatidiform mole in some way is etiologically related to chorioepithelioma, though there has never been demonstrated a type which one might regard as the etiologic forerunner of malignancy. Why a certain number of moles become malignant is unexplainable. In their early cell architecture they probably contain elements which may determine their subsequent character. Unquestionably a large number of moles, though not the majority by any means, become malignant choriomas. Indeed, from the relatively large number of moles encountered the percentage of malignant transformation is not high. It is sufficiently high, however, to remind one of this outstanding danger.

Statistics regarding malignant degeneration of hydatidiform mole, while not in strict harmony, place the percentage figure at a consistently high point. Payne, refers to Pallosson and Violet who report 455 cases of chorioepithelioma, 203, or forty-four per cent of which were preceded by hydatidiform mole. Of the 500 cases of mole collected from the literature by Findley, 157 or 31.4 per cent became malignant choriomas.

Kerr believes, as do a great many writers, that hydatidiform mole precedes chorioepithelioma in 50 per cent of cases. Novak refers to the well-known series of cases reported by Teacher. Of the 188 cases of chorioepithelioma studied by Teacher, seventy-four or 39.3 per cent were preceded by mole.

Senatchens reported forty-nine cases of hydatidiform mole and three, or 13 per cent of these developed chorioepithelioma subsequently.

Novak claims, however, that only a very small percentage of moles, (not more than 1 per cent) become malignant. In support of this view he says: "The frequency of moles is not appreciated and besides malignant choriomas are comparatively rare."

As regards the degree of malignancy of chorioepithelioma following hydatidiform mole, it has been demonstrated that choriomas arising after simple abortion or full-term pregnancy are more viciously malignant than those following mole formation.

In Teacher's series of 188 cases of chorioepithelioma, with respect to the degree of malignancy in those following mole and uncomplicated pregnancy, the mortality figures were given as follows:

Following mole	53.5 per cent
Following abortion	66.7 " "
Following full-term labor	89.6 " "
Following ectopic pregnancy	85.7 " "

In the combined statistics of Leckhart and Teacher (quoted by Findley), the mortality was as follows:



Following hydatidiform mole	52.9 per cent
Following abortion	64.3 " "
Following full-term normal pregnancy	66.6 " "

With regard to the microscopic determination of the potentially malignant mole, there is no type of cell to forecast its ultimate character. Caturani, who has carefully studied this phase of the question, points to certain features which might guide one in determining either the benignancy or malignancy of hydatidiform cysts. Specimens in which the features of the primitive chorion are reproduced in a hydatidiform mole, he always regards with suspicion. The evidence of a malignant tendency of a mole may, to a certain degree, be determined also by a close investigation of the relation of the mole to the maternal structures. Moles which show a distinct tendency to invade the endometrium or myometrium he regards as transitional forms.

*Mortality of Hydatidiform Mole.*—The mortality rate of hydatidiform mole will depend somewhat, first, on the stage of pregnancy in which the disease begins, second, on the invasive nature of the tumor, and third, on its benignant or malignant character.

In Findley's series of 500 cases there were 265 designated as benign and of this number 237 patients recovered and twenty-eight died, a mortality of 10.5 per cent. Ninety-nine moles subsequently became malignant and forty-five of these patients recovered and fifty-four died, a mortality of 54.5 per cent. In the sixty-eight cases recorded during the past four years the ultimate result was mentioned in sixty-four. Fifty-eight of the patients recovered and six died, a mortality of 9.4 per cent.

The cause of death was attributed to hemorrhage in four, two of which were associated with rupture of the uterus. One patient died of secondary peritonitis and one of secondary chorionic malignancy. With respect to the mortality as indicated in the literature it is set as low as 9 per cent by Gordon and as high as twenty-six by Williamson.

Probably a mortality of ten per cent could be looked upon as a fair minimum and fifteen per cent as a fair maximum, provided the patients are properly treated and exclusive of secondary malignancy.

*Time of Occurrence.*—Cystic degeneration of the chorion, while it may occur in the latter months of pregnancy, most frequently arises during the embryonal or early fetal period of the ovum. In general, it may be said to occur most commonly during the first or early part of the second trimester of gestation. Sometimes it arises as late as the third trimester.

In the series of sixty-eight cases in which this feature was mentioned, one case was reported as occurring as late as the twelfth month and Findley refers to a case arising in the seventeenth month of pregnancy, though no special data are charted concerning this unusual case. The following table portrays the time of occurrence in thirty-four cases in which this phase of the condition was noted:

1 to 2 months	2 cases or 5.8 per cent
3 to 4 months	19 cases or 55.8 " "
3 to 6 months	9 cases or 26.6 " "
7 to 8 months	3 cases or 8.8 " "
12th month	1 case or 2.9 " "

In Velasco's series the time of occurrence was recorded as follows:

1 to 2 months	2 cases or 5 per cent
3 to 4 months	16 cases or 40 " "
5 to 6 months	9 cases or 22.5 " "
7 to 8 months	3 cases or 7.5 " "

From these figures, it is safe to assert that at least 75 per cent of cases occur between the third and fourth month of pregnancy.

*Age.*—Hydatid degeneration of the chorion is essentially a disease of the most active childbearing period.

Of the sixty-eight cases reported from 1921 to 1925, the age of the patient was mentioned in sixty-three, as follows: Below 20, 12 cases; 20 to 30, 30 cases; 30 to 40, 18 cases; 40 and beyond, 3 cases.

In Velasco's series the age was: Below 20, 10 cases; 20 to 30, 19 cases; 30 to 40, 10 cases; 40 and beyond, 2 cases.

In Findley's 500 cases, the age was recorded in 394 as follows: 13 years, 2 cases; 14 years, 1 case; 15 to 25 years, 111 cases; 25 to 35 years, 143 cases; 35 to 45 years, 84 cases; 45 to 50 years, 36 cases; 50 to 55 years, 17 cases.

In the figures quoted above it is shown, as one would naturally assume, that the disease corresponds to the most active reproductive period of life, namely, from the twentieth to the thirty-fifth year. Of a total of 498 cases in which the age of the patient was mentioned, 348 or 69.8 per cent occurred between the years of twenty and thirty-five and 150 or 30.2 per cent before the twentieth or after the thirty-fifth year.

*Size of Uterus.*—It is generally taught that hydatidiform mole is in most instances accompanied by an excessive enlargement of the uterus, which is out of proportion to the stage of pregnancy, or which does not correspond to the period of amenorrhea. It is probably safe to say that the uterus, in the majority of cases, is about twice as large as the period of amenorrhea would indicate. In seventeen cases in which the size of the uterus was noted, it was reported as larger than the normally pregnant organ in nine cases, smaller than normal in five cases and normal for the period of amenorrhea in three cases.

*Previous Pregnancies.*—It is held that the neoplasm is most commonly found in patients who have borne children previously. In this connection it may be well to point out the conviction that the birth of an uncomplicated mole does not cause sterility and that recurrence of the trouble in subsequent pregnancy, while not the rule, is not improbable. Recurrence has been observed from two to eighteen times and in my series of sixty-eight cases, one patient gave birth to moles on eleven occasions. Recurrence, however, is rare. In Findley's 500 cases, recurrence was observed in seven, or 1.4 per cent only. It is interesting to note that normal pregnancy followed in twenty-five cases or 5 per cent.

As regards the relation of mole to previous pregnancies, this phase of the matter was recorded in fifty-six of the sixty-eight collected cases. The disease arose thirty-eight times, or 67 per cent in multiparae and eighteen times, or 33 per cent in primiparae.

In Velaseo's forty cases, 70.2 per cent were multiparae and 27.8 were primiparae.

The character of the preceding pregnancy does not seem to bear any relationship etiologically, as it does to chorion epithelioma. In fifty-six cases in which reference to previous pregnancies was recorded, there were seven abortions, one stillbirth, one difficult forceps delivery and one case of long standing postpartum spinal paralysis. In forty-seven patients, the previous obstetric history was normal.

*Lutein Cysts and Hydatidiform Mole.*—Twenty-five years ago (1901), Stöckel directed attention to the possible etiologic relationship of lutein cysts to hydatidiform mole, and especially to chorion epithelioma. Many theories respecting the influential rôle lutein cysts are thought to play in chorionic tumors have been set forth, but no positive proof as to their causative influence has been adduced. They may have some bearing on a neoplastic tendency of the chorion and they may not. In most instances, or in approximately 90 per cent of cases, the ovaries are not cystic, or grossly deranged in any way.

In Findley's 500 cases of mole, cystic ovaries were found in only fifty-eight or in 11.6 per cent.

In the sixty-eight moles recorded from 1921 to 1925, reference was made to the association of bilateral ovarian enlargement in only one case.

Keller refers to instances in which lutein cysts do not precede but follow mole and, therefore, may be secondary. It has also been demonstrated that ovarian cysts frequently undergo regression after expulsion of the mole. In this connection it is well to mention that bilateral ovarian cysts are more commonly associated with chorioepithelioma than mole.

Coventry quotes Paletini, who in 1905 collected sixty-eight malignant choriomas and of this number sixty-two or 91 per cent were associated with bilateral lutein cysts. Coventry also reports two personal cases of hydatidiform mole, one of which was associated with lutein cysts.

With our present knowledge regarding the association of lutein cysts, cysts at times assuming an attitude of aggression, at other times one of regression, it is impossible to determine if their presence is incident to the pregnancy or coincident with the pathologic alteration in the chorion. That they may be etiologically related is possible, but thus far no legitimate proof that they are actually causative has been presented. To stand the test of etiologic relationship they should be at least a fairly constant and not an occasional accompaniment of hydatidiform mole.

*Presence of a Fetus.*—Most writers are in accord with the teaching that in most instances a mole is expelled without any evidence of a

fetus accompanying the expulsion. It is obvious that, with extensive degeneration or destruction of the mechanism concerned in fetal nutrition, early fetal death must be inevitable. With only partial destruction of the chorionic membrane, the fetus may for a time survive and be expelled with the cystic mass.

In the series of sixty-eight cases recently collected from the literature, the fate of the fetus was mentioned in fifty-five. It was absent in forty-nine cases, or in 81.1 per cent and present in six or 10.9 per cent.

In fifty cases studied by Velasco the fetus was absent in forty-seven or 92.5 per cent and present in three or 7.5 per cent. In the combined 105 cases, the fetus was absent in 96 cases or in 91.5 per cent and present in nine cases or in 8.5 per cent.

The fetus was found in my personal case, as indicated in the case history. In this patient the expulsion of the fetus preceded the expulsion of the mole by several hours.

It is well to keep in mind that the primary expulsion of a fetus, placental tissue and membrane followed some hours later by the expulsion of the mole might indicate a possible twin pregnancy. This, according to Frank, has been observed repeatedly.

Of course, it is quite possible for a mole and fetus to be expelled simultaneously, though it would seem physically impossible for a well-developed fetus and an advanced mole to exist except in plural pregnancy in the uterus at the same time. In moderate or extensive cystic degeneration of the chorion destruction of the fetus is inevitable. A well-developed fetus with placenta and membranes, as found in my patient associated with a well-developed placental neoplasm, would be suggestive at least of a plural gestation.

*Case Report.*—Mrs. C. M. D., age thirty, was first seen on December 1, 1924. She had never suffered from any serious disease. Menstrual history normal. The last normal period occurred on August 28, 1924. The patient was married seventeen months prior to coming under observation. She had not been pregnant. She stated she had not been well since her last "period" in August.

Four weeks prior to admission she experienced considerable pain in the lower part of the abdomen and this was followed by a bloody discharge, which continued daily to the period of coming under observation. Usually the discharge was thin and watery, but occasionally it was thick and contained clots of varying size. During the period of amenorrhea she had some nausea and vomiting generally in the morning, but occasionally also in the evening. Ten days before admission the patient experienced considerable difficulty in breathing. This became progressively worse and her breathing, on admission to the hospital, was only possible while in a sitting posture. For several days, the patient had noticed moderate swelling of the ankles. This was always worse in the evening. She also complained of swelling of the eyelids, which was worse at night. She had some frontal and temporal headache and this had been present during the preceding two months. She experienced also considerable dryness in the mouth and throat, more pronounced at night. During the two days prior to admission, she coughed and at times expectorated

a blood-tinged mucus, coincident with the embarrassed respiration. Micturition had been frequent both by day and by night, but especially during the night.

*Physical Examination.*—The most prominent symptom was the marked dyspnea. It was impossible for the patient to breathe except in the sitting posture. The veins in the neck were noticeably engorged, but there was no cyanosis or jaundice.



Fig. 1.—Portion of mole expelled December 3, 1924. Part of clotted blood also visible in specimen.

Pretibial edema was present and there was slight swelling of the eyelids. The tongue was fairly clean, though dry. The eye-grounds were much paler than normal and the veins seemed "overfull." There was no retinal hemorrhage. The breasts showed the usual changes of early pregnancy. There was no evidence of complicating disease in the lungs.

The apex beat was slightly displaced to the left. There was a presystolic murmur and a thrill at the apex, but there were no signs of incompetency. X-ray exam-

ination of the chest showed some unusual peribronchial thickening, but no evidence of neoplastic disease.

The abdominal muscles were more or less hypertonic and there was distinct tenderness in the region of the liver. The uterine body was found enlarged and extended to the umbilicus. The enlargement was uniform, and intermittent contractions were observed. The size of the organ corresponded to a six months pregnancy and exceeded, therefore, the period of amenorrhea by at least two months. A diagnosis of pregnancy with toxemia and threatened abortion was made. This was confirmed on vaginal examination.

Temperature, 98.2; pulse, 118; respirations, 28; and blood pressure, 150 and 90.

The blood counts were as follows: December 1, erythrocytes, 1,550,000; leucocytes, 11,800; color index, 1.4; hemoglobin, 35 per cent.



FIG. 2.—Section of mole expelled December 3, 1924.

On December 8, following blood transfusion of 500 c.c., there were erythrocytes, 2,040,000; leucocytes, 10,800; hemoglobin, 45 per cent; and color index, 0.87.

Twenty-four hours after the patient was admitted, the bleeding became more marked and associated with a serous discharge.

Uterine contractions began coincidently and thirty-six hours after admission the patient expelled a fetus, some placental tissue, particles of membrane and large blood clots. After the expulsion of these materials, the bleeding abated considerably, but the uterus remained large. At midnight of the second day following admission, the patient expelled a large mass of organized blood clot. This contained cystic masses, frog's eggs, of varying size, and was followed by profuse bleeding. The patient was given 500 c.c. of blood by direct transfusion. A mild chill followed the procedure. Prior to this, the patient appeared gravely ill.

After the administration of the blood, her condition seemed to improve in every way. She ran a progressively improving convalescence and was discharged from the hospital thirteen days after admission.

On the date of discharge there was a slight bloody vaginal discharge, but examination showed the uterus well contracted and seemingly normal. The expulsion of the cystic mass, hydatidiform mole, was not followed by surgical therapy, since, in view of the pathologic report, active interference did not seem indicated.

The pathologic report of the material expelled, as submitted by Dr. Bowman C. Crowell, follows:

The specimen consists of a thin red membrane about the size of the palm of the hand, adherent to which is a mass of villous shreds. The shreds are almost white and transparent. At the extremities and along the course of some of these villous processes are small bullous swellings. The whole mass has a volume of about 300 c.c. (Figs. 1 and 2.)

Microscopic sections show degenerated chorionic villi covered by syncytial cells. These in places have multiplied to form buds on the villi, and some of these cells are detached to form small sheets of cells. Isolated cells of this nature may be

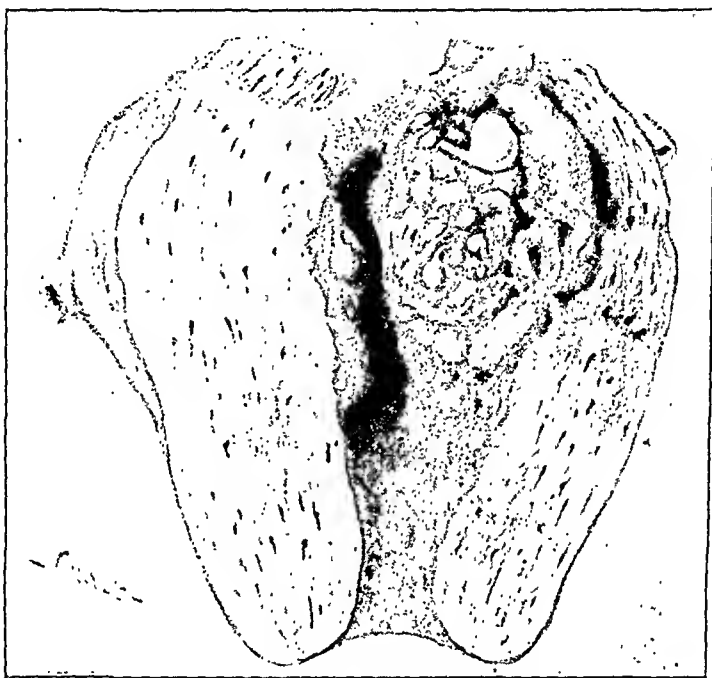


Fig. 3.—Uterus opened to show primary tumor.

seen in the mass of blood clot. There is no visible proliferation of the Langhans' cells. Diagnosis: Chorioadenoma.

The malignancy of this specimen is doubtful, but I am inclined to regard it as a benign process.

After the patient returned to her home she developed a severe tonsil infection and was quite ill. The uterine bleeding did not subside, but it gradually became worse. Every "three or four days" it was accompanied by the discharge of clots of varying size and this always occasioned a great deal of pain.

On January 16, 1925, forty-six days after the expulsion of the hydatidiform mole, she had a severe chill and her temperature rose to 103° F. She was readmitted to the hospital on January 18. On admission, her morning temperature was 99° and it registered 101.4° in the evening. It then pursued a mild fluctuating type. The pulse rate was 110 and the respiratory 26. The blood pressure 118/64.

The blood examination showed: erythrocytes, 3,600,000; leucocytes, 5,100, hemoglobin, 60 per cent; and color index, 0.83.

The urine, with a specific gravity of 1020, except for a faint trace of albumin, was negative.

The abdominal wall was flat, though there was slight tenderness over the lower portion. No masses were palpable. Vaginal examination revealed the uterus in good position, freely movable and not appreciably enlarged. It could be moved about without causing undue discomfort and without exciting bleeding. No irregularity in the contour of the organ could be discerned. There were no palpable signs of adnexal disease.

The patient was kept under observation in the hospital for a period of nine days. During this time, the hemorrhage continued. Some clots of moderate size were expelled. No "cystic masses" were seen. Owing to the continued bleeding, it was assumed that particles of membrane or placenta or both had been retained, though the possibility of a proliferating hydatidiform mole, or its sequela, a chorio-epithelioma, was constantly in mind.

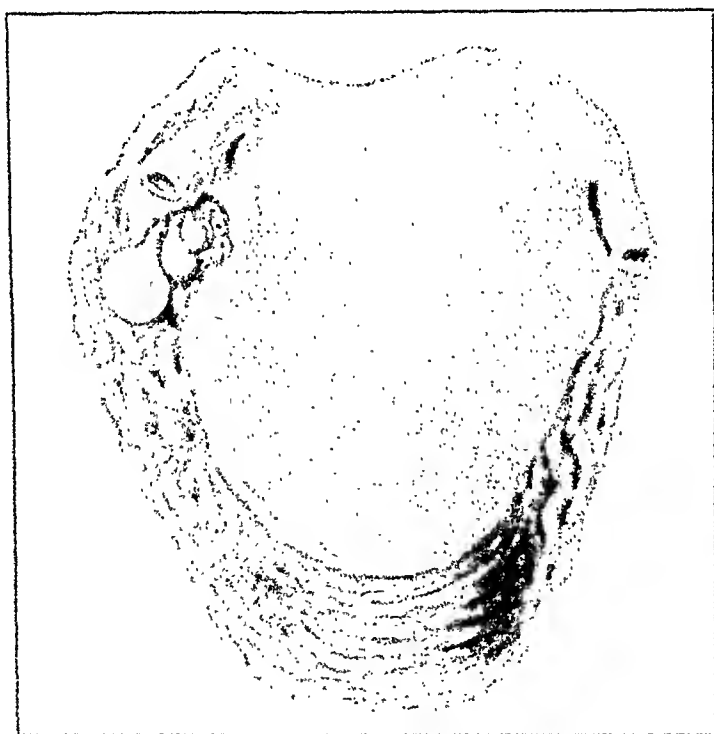


FIG. 1.—SCARF surface of uterus showing cysts projecting from penetrated wall.

Accordingly on Jan. 27, fifty-eight days after the patient first came under observation, an exploratory curettage was performed. The tissue removed by this procedure was, largely from its gross appearance, regarded as organized blood. Close inspection of the material disclosed some "hydatid" cysts, but these were not numerous. From the fragmentary character of the blood combined with the presence of hydatid cysts, it was thought prudent to perform an exploratory hysterectomy. Accordingly, an abdominal incision was made. The uterus was not grossly enlarged nor was there visible alteration in its contour. On exposing the interior of the organ there was found a necrotic area, 3 cm. in diameter in the left posterolateral wall. The surface of this area had obviously been disturbed by the preceding curettage. A tentative diagnosis of chorio-epithelioma following hydatidiform mole was made. The hysterectomy incision was closed immediately. Realizing the etiologic relation corpus lutein cysts are thought to bear to hydatidiform



mole and chorioepithelioma, the ovaries were carefully inspected and found to be normal in every particular. It was regarded as impossible, therefore, for these organs to have any bearing on the uterine condition. The uterus was immediately removed, but the ovaries and tubes were allowed to remain. (Fig. 3.)

Immediately after the operation, the patient was given 700 c.c. of blood by direct transfusion. The recovery of the patient following operation was uneventful and on February 17, she left the hospital in good condition.

The pathologic examination of the specimen was made by Dr. Bowman C. Crowell and his report is herewith presented:

The specimen measures 4.5 cm. from above downwards, 5 cm. transversely and 3.5 cm. anteroposteriorly. The wall of the uterus is 2 cm. in thickness approximately. On opening the uterus there is seen an ulcerated area in the region of the left cornu, projecting from which is a rather tough, yellowish, gray material in which may be seen a few transparent, thin-walled cysts two or three mm. in diameter (Fig. 3). The endometrium about this, as well as about the right cornu, appears thickened and yellowish. In the myometrium near the periphery

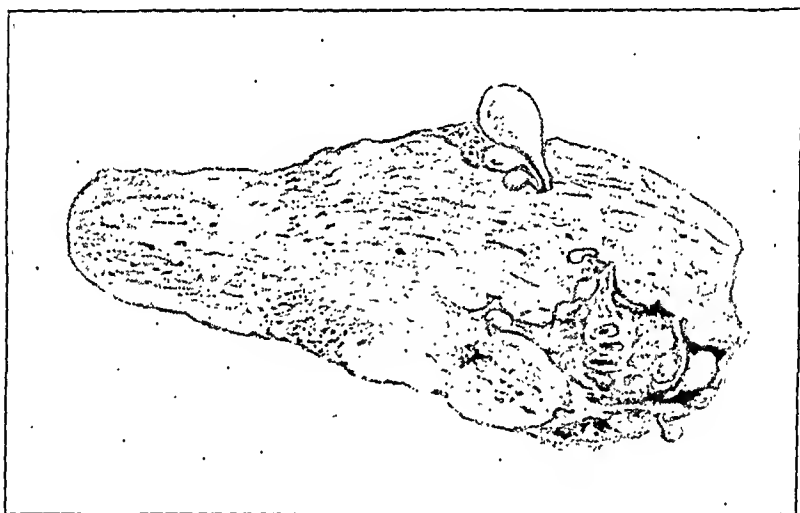


Fig. 5.—Showing section through tumor with penetration of uterine wall.

are seen small vessels in or about which is an opaque yellowish material, small in amount. On the outside of the uterus, below the attachment of the left fallopian tube, project two small, grape-like cysts, similar to those seen in the ulcerated area of the endometrium. (Figs. 4 and 5.) These cysts are in all respects similar to those seen in the specimen expelled from the uterus which was received in the laboratory Dec. 3, 1924. In addition, there is thickening of the endometrium and infiltration of the myometrium. A section was removed for histologic examination from the right side of the uterus so as to include the entire thickness of the myometrium. Further cutting of the gross specimen was avoided in order to preserve it for drawing. (Fig. 6.)

Microscopically, this particular section shows no remnant of the endometrium. The myometrium is edematous and there is also a mononuclear and lymphocytic infiltration of the myometrium which is rather extensive in some parts. Small areas of necrosis of the myometrium are also present. In addition there are seen diffusely scattered throughout the myometrium large mononucleated cells with abundant clear protoplasm. Some of these cells have two small nuclei, others have very numerous nuclei and still others large chromatin masses. (Fig. 7.) In some places it appears as though some of these nucleated masses were within muscle

fibers. It is obvious that these cells are of the same nature as those described clothing the villi in the original choriadenoma previously reported from this case. In about the central zone of this section, or somewhat nearer the periphery than the endometrium, there is a vein in the lumen of which are numerous large cells forming a syncytial mass. (Fig. 8.) These are similar to those cells which have been described in the myometrium, and these cells are found in several successive sections removed from this block of tissue.

*Diagnosis.*—Malignant choriadenoma.

An incision through the uterus was made later in such a way as to pass through the larger mass presenting on the endometrial surface and extending to the outer surface of the uterus at a line just posterior to the left fallopian tube where the tumor is seen to be extending through the entire thickness of the myometrium.

Histologic examination of the section thus removed shows the remains of the chorionic villi with proliferating syncytial cells in the inner part of the diffuse infiltration with multinucleated cells, as above described in the outer part.



Fig. 6.—Section from uterus after extirpation showing mole penetrating endometrium.

After leaving the hospital, the patient improved very rapidly and seemed to be quite well. On October 1, 1925, she again came under observation complaining of vague pain in the left side of the pelvis, and on October 19, vaginal examination revealed a small cystic mass in the left pelvic cavity. Blood examination at this time showed: Erythrocytes, 4,230,000; leucocytes, 4,200; hemoglobin, 83 per cent.

The patient was kept under observation until Oct. 26, or for a period of eight days. In order to determine the true nature of the left pelvic mass, an exploratory posterior vaginal incision was advised.

The patient was anesthetized and an exploratory posterior vaginal incision was made. Through the vaginal opening a semifluctuating globular mass, comparable in size to a small orange, was outlined. The mass was not firmly adherent, but it was not freely movable.

In location, consistence and contour, it resembled a simple ovarian cyst. The pelvis in general was free from adhesions. The probability of recurrent chorion epithelioma was considered. Gentle efforts to free and deliver the mass through the vaginal opening failed. In order to determine the nature of the tumor, a blunt-pointed scissors was carried into the mass and the blades were separated.

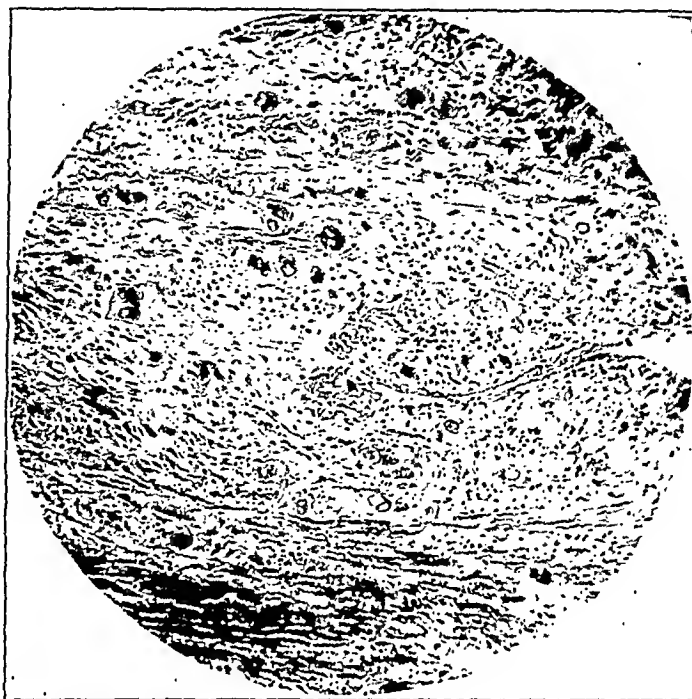


Fig. 7.—Section from uterus near cornu, showing malignant changes.



Fig. 8.—Section of vein in midst of myometrium. Shows cells lying free in lumen, derived from malignant mole.

This on afterthought was obviously an exceedingly imprudent procedure. It was followed immediately by a mammoth and most alarming hemorrhage. Efforts to control the bleeding from below failed utterly and accordingly an abdominal incision was made. The bleeding surface was isolated and the hemorrhage itself was finally controlled by the introduction of a series of "mass" suture ligatures. The

patient, despite every possible means of restoration, succumbed to the tremendous blood loss one hour subsequently.

Some of the tissue, grossly resembling organized blood clot, removed through the vaginal incision was collected and proved, on microscopic examination, to be recurrent chorioepithelioma. The final laboratory report is herewith presented:

All semblance of villi has been lost, and the small fragments of tumor examined consist of solid masses of large cells closely packed together. These cells are remarkably uniform, large, polyhedral, with protoplasm that scarcely takes the stain, and fairly large, round, deeply-staining nuclei. Mitotic figures are numerous. Between these solid groups of cells are a few strands of more elongated, but equally active cells. All of these cells are apparently of syncytial origin, and closely reproduced the changes found in the uterine tumor itself. (Fig. 9.)

*Diagnosis.*—Choriocarcinoma.

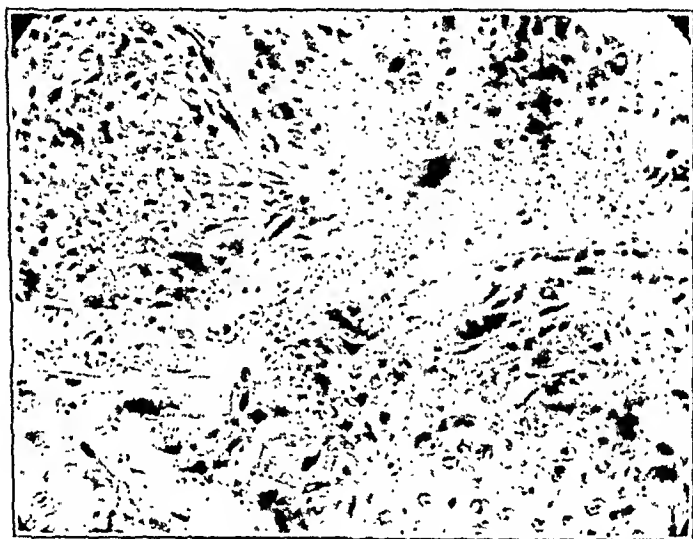


Fig. 9.—Section from pelvic mass, (Incised October 26) showing same character of growth as in uterus shown in Fig. 4.

#### COMMENT

A study of this case record portrays clearly the transition of a lesion which was regarded both clinically and pathologically as a benign hydatidiform mole; to a perforating or malignant mole and finally to a highly malignant chorioepithelioma.

It would seem a logical deduction to regard all hydatidiform moles, associated with persistent or recurrent bleeding, bleeding arising after the expulsion of the parent tumor, as potentially malignant, as the forerunner of chorioepithelioma. The bitter lesson taught by the unfortunate outcome of this case emphasizes the futility and grave danger of attempting to determine the true nature of the growth by exploratory methods.

In any case of suspected chorioepithelioma radical measures, if any measure at all is considered, alone should be adopted.

The hemorrhage encountered in this patient was the most frightful I have ever seen and only comparable to that in fatal placenta previa.

Since the operation with its tragic sequela was witnessed by a large number of Fellows of the American College of Surgeons, I feel that a full report of the case with the ultimate result and pathologic diagnosis should be recorded.

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(For discussion, see page 265.)

## THE SIGNIFICANCE OF THYROID ENLARGEMENT DURING PREGNANCY\*

BY J. WILLIAM HINTON, M.D., NEW YORK CITY

(Assistant Professor of Surgery at New York Post-Graduate Medical School and Hospital; Adjunct Assistant Visiting Surgeon Bellevue Hospital)

A CERTAIN percentage of thyroid diseases can be eliminated if the condition is recognized early. During pregnancy the thyroid gland enlarges in a definite percentage of patients. It varies in different localities, and it is estimated that anywhere from 25 per cent to 80 per cent of pregnant women have a thyroid dysfunction. It falls to the part of the obstetrician to recognize and treat this condition during pregnancy. A definite understanding of the classification of thyroid diseases is essential before intelligent advice or treatment can be rendered. The following classification is the one used in this clinic which follows along the lines of Plummer's work at the Mayo Clinic. *First*. Goiters with approximately normal secretory activity or hypothyroidism. A. Adolescent goiter,—physiologic gland with secretory activity diminished. B. Adenomatous goiter,—pathologic gland with secretory activity diminished or normal. C. Colloid goiter,—pathologic gland with secretory activity diminished. *Second*.

\*From the Goiter Clinic of Dr. Charles Gordon Heyd's Service at the New York Post-Graduate Hospital and Medical School.

Goiters with increased secretory activity. A. Adolescent goiter,—physiologic gland with slightly increased secretory activity. B. Adenomatous goiter,—pathologic gland with overfunction. C. Graves' disease or exophthalmic goiter,—pathologic gland with overfunction and dysfunction.

*Adolescent Goiter.*—Adolescent goiter does not concern us at this time, either that with normal secretion or that with hyperthyroidism, as this condition is always seen at the period of adolescence, between the ages of eight and fifteen years.

*Colloid Goiter.*—This is the enlargement that is most commonly encountered during pregnancy. The thyroid gland is not capable of meeting the excessive demand made on it at the time of pregnancy, and in its final effort colloid is secreted into the acini. This is not absorbed

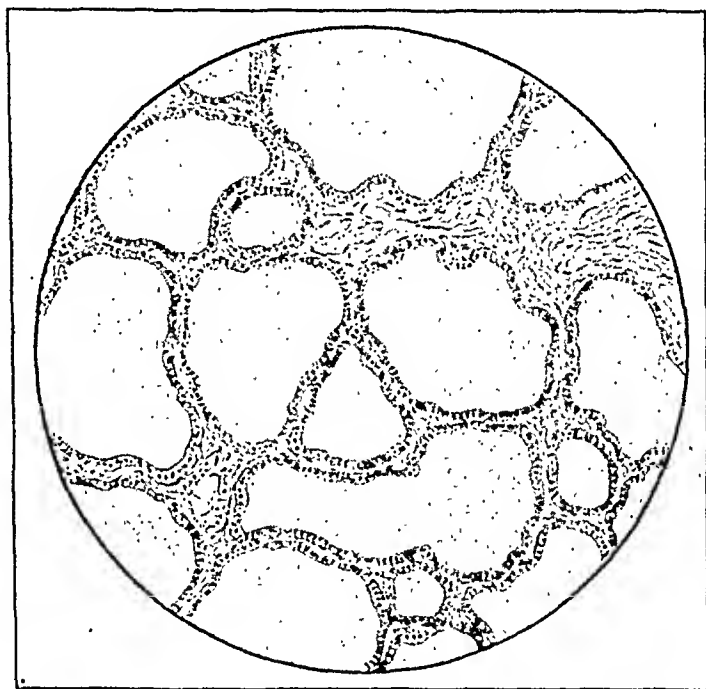


Fig. 1.—Section of adolescent goiter showing the acini dilated and filled with colloid without changes of the epithelial cells.

and the acini soon become distended, at which time the patient presents a uniform, soft enlargement affecting the entire gland, and no nodules can be detected. There is no evidence of a thrill or bruit over the thyroid. The pulse is normal and the patient is usually of a phlegmatic type, with no evidence of increased secretory activity. This condition never takes on hyperthyroidism.

*Treatment.*—The condition can be cured medically and the sooner the treatment is begun the better the prognosis. Thyroid extract, gr.  $\frac{1}{2}$ , three times daily for three weeks out of each month should be tried. If this is inadequate the dosage can be increased to as high as

6 to 9 grains daily. These patients should not be put on continuous medication, as a hyperthyroidism may be produced from the medicine. Thyroid extract seems preferable to iodine, although the principle of the two is the same.

*Adenomatous Goiter.*—Adenomas of the thyroid encountered during pregnancy are usually seen after the second, third, or fourth gestation and they are more commonly seen when the pregnancies have followed in rapid succession. In this type one finds a definite nodule or mass which is confined to one lobe or occasionally to the isthmus of the gland, and which gives the neck an asymmetrical appearance. On palpating the neck, which is best done by standing behind the

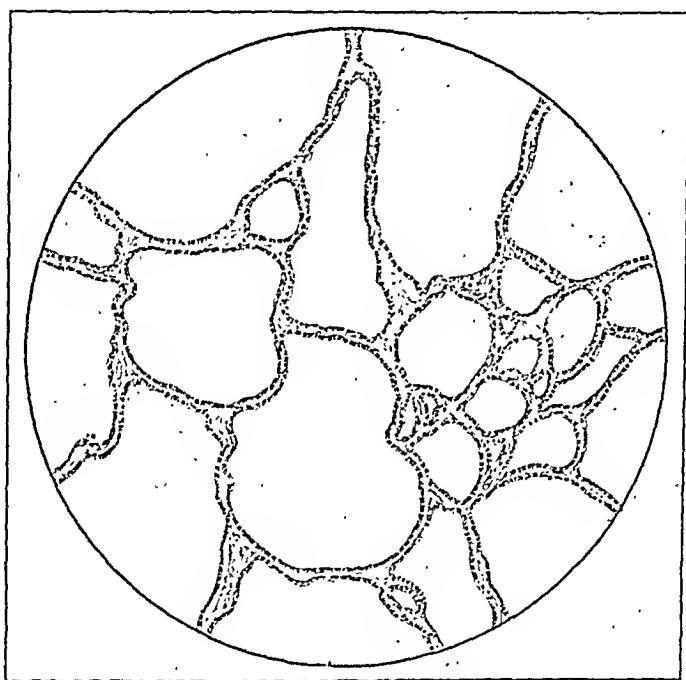


Fig. 2.—Section from a colloid goiter showing the acinar epithelial cells flattened and inactive.

patient and placing the hand over the thyroid region, one finds the mass much firmer than the surrounding thyroid tissue, and usually the remaining portion of the gland is entirely normal. Diffuse adenomas are occasionally encountered involving the entire gland. It is important to make a definite diagnosis between adenomatous and colloid goiter. The former is not amenable to medication. It is unwise to treat patients suffering from adenomatous goiter with iodine or thyroid extract, as the condition cannot be cured, although the swelling of the neck may be diminished, due to the absorption of the colloid in the adenomatous mass. In this condition one is dealing with an encapsulated tumor, and it is as unreasonable to expect to cure the condition with medicine as it is to cure an adenoma of the breast or

uterus by internal medication. The danger of the treatment is that a hyperthyroidism may be produced sooner than would ordinarily occur. With a normal basal metabolism it is unwise to administer medicine in any form. If the patient has already developed a hyperthyroidism from the existing adenoma, ovarian substance, gr. 3, and pancreatic substance, gr. 2, can be administered three times daily. The ovaries and the pancreas have an inhibitory effect over the thyroid activity, and it is advisable to check the hyperthyroidism until the pregnancy is terminated and the case can be submitted to operation.

*Exophthalmic Goiter or Graves' Disease.*—This condition is occasionally encountered during pregnancy, but it is relatively rare as

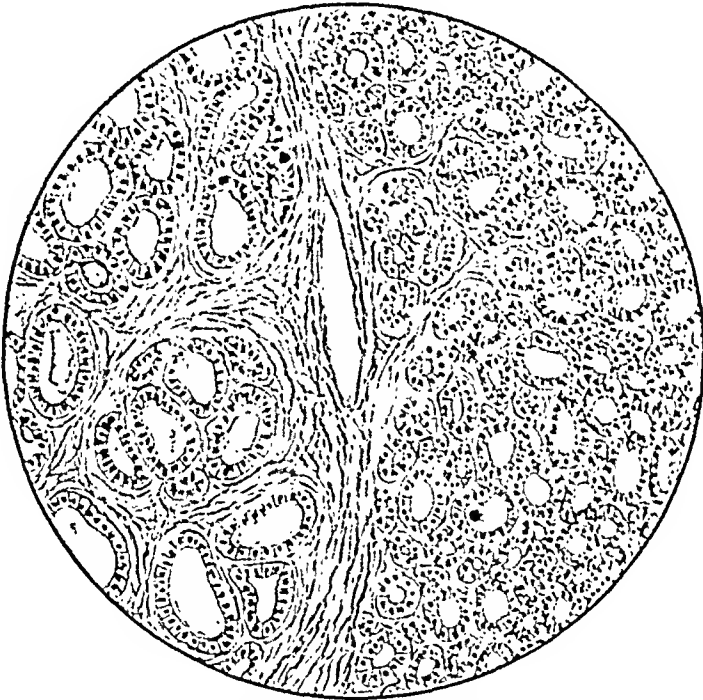


Fig. 3.—A section of the fetal adenoma to the left with capsule separating the normal thyroid tissue to the right.

compared with the other thyroid disturbances. Advice and treatment of the patient depend on several factors. First, the severity of the disease and secondly, the duration of pregnancy. If the disease is rather severe and the patient is in the early months of pregnancy, it is usually best to abort the patient. If the patient is in the fifth or sixth month and the disease is relatively mild, it is usually safe to carry the patient to term without undue harm. If the patient is past the fifth month and critically ill, it is probably best to ligate the superior thyroid arteries and carry her along with medical care. It may be necessary in some cases to perform a thyroidectomy, but this will depend on the clinical picture. Lugol's solution is not to be used as a curative measure.



*Indications for the Use of Iodine and Thyroid Extract During Pregnancy.*—Iodine or thyroid extract should always be used in colloid hypertrophy of the thyroid. As this is the type most frequently encountered during pregnancy, the prognosis in thyroid disturbance is favorable. Adenomatous goiter seems to have its origin during intra-uterine life from embryologic tissue which forms the fetal adenomas or Wolfer's rests. These are formed, presumably, due to the lack of iodine in the mother at this time. These fetal adenomas do not serve a useful function to the system, but during the three periods of life in which excessive work is thrown upon the thyroid; namely, during adolescence, the childbearing period, and the menopause, these cells in

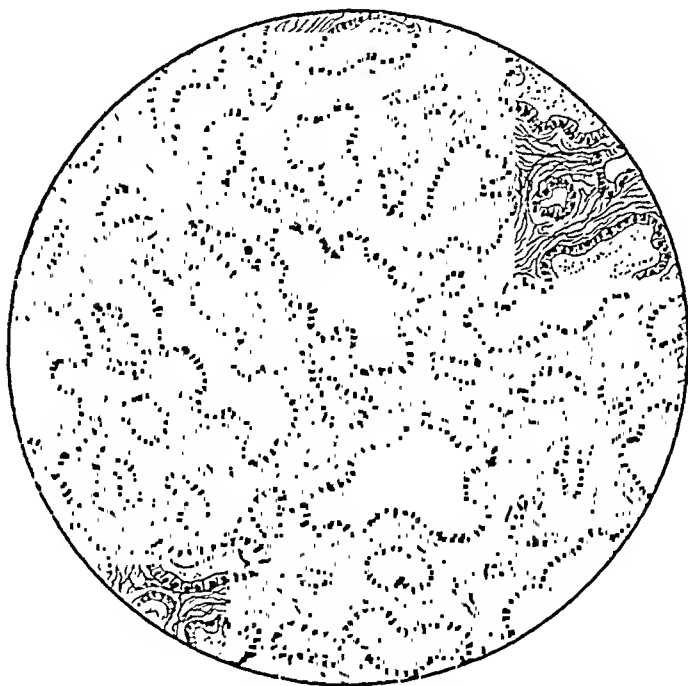


Fig. 4.—Section from exophthalmic goiter or Graves disease with hypertrophy and hyperplasia of the acini.

trying to meet the demand of the system for more secretion, hypertrophy and are first noticed as a clinical entity. It is probable therefore that by the proper administration of iodine or thyroid extract to the mother with a colloid hypertrophy, fetal adenomas can be prevented to a great extent. The elimination of the fetal adenomas reduces the incidence of thyroid malignancy very markedly, as most malignant tumors of the thyroid arise from preexisting adenomas.

*Contraindications to the Use of Iodine or Thyroid Extract During Pregnancy.*—Iodine and thyroid extract are always contraindicated in adenomatous goiter during pregnancy as they cannot accomplish any useful end and only invite hyperthyroidism at an earlier date. In Graves' disease it is never advisable to use iodine as a curative meas-

ure. Its only indication is as a preoperative medication for lessening the toxicity of the patient. This is accomplished, presumably, by giving the patient a completely formed thyroxin molecule which is less toxic than the secretion which is normally given off in a patient suffering from Graves' disease, or in other words, temporarily transferring the secretion from that of a Graves' disease into that of an adenomatous goiter with hyperthyroidism which is less toxic than that of a Graves' disease. If the medication is continued, it loses its beneficial effect and produces a more marked hyperthyroidism than the patient had originally; in other words, its usefulness is outlived in approximately three weeks.

### CONCLUSIONS

1. Colloid goiter is the one type most frequently encountered during pregnancy, and it is curable by administering iodine or thyroid extract.

2. The prevention of adenomas in later life can be accomplished by treating women with colloid goiter during pregnancy.

3. The elimination of adenomas greatly reduces the incidence of thyroid malignancy.

## UTERINE PROLAPSE ASSOCIATED WITH SPINA BIFIDA IN THE NEWBORN, WITH REPORT OF A CASE

By I. H. NOYES, M.D., F.A.C.S., PROVIDENCE, R. I.

THE patient was a fullterm female infant, aged eighteen days. She was the tenth child, the others said to have been without congenital defects. The mother at once noticed an abnormal condition of the back which she feared was due to injury sustained by falling to the floor at birth during a precipitate labor. After a few days it became apparent that the right lower extremity was moved less than the left but the child nursed well and, aside from what was considered a "heat rash," seemed quite normal. When about two weeks old a protrusion through the vulva was noticed. This increased in size and so alarmed the mother that the advice of a physician was sought. On the following day the infant was taken to the hospital where a skiagraph of the spine was made but the child was not permitted to remain. Three days later I saw the patient, a poorly nourished infant with a large unruptured meningocele in the lower lumbar region and complete prolapse of the uterus and vaginal walls. The cervix protruded 5.5 cm. from the vulva, the corpus uteri could be palpated between the vaginal walls at the outer portion of the mass and a soft hernial sac could be felt above. The whole mass could be replaced within the body by exerting slight pressure but promptly reappeared when released. If the child cried or strained there was noticeable bulging of the whole ischiorectal region and a slight eversion of the anus. Two days later, after rupture of the meningocele had occurred, the child was seen again in consultation with Dr. Maurice Adelman. The baby was then moribund. The head, chest and abdomen showed nothing abnormal but the skin of the entire body was thickly covered with a punctate hemorrhagic

rash, presumably of several days duration. There was marked desquamation on the hands and around the ends of the fingers. Over the lumbar spine there was a ruptured spina bifida sac 7 cm. in diameter. The membranes were covered with a fibrinopurulent exudate. There was a very definite bony defect involving the fourth and fifth lumbar vertebrae. The reflexes above the umbilicus apparently were normal, but over the lower third of the abdomen and the lower extremities sensation

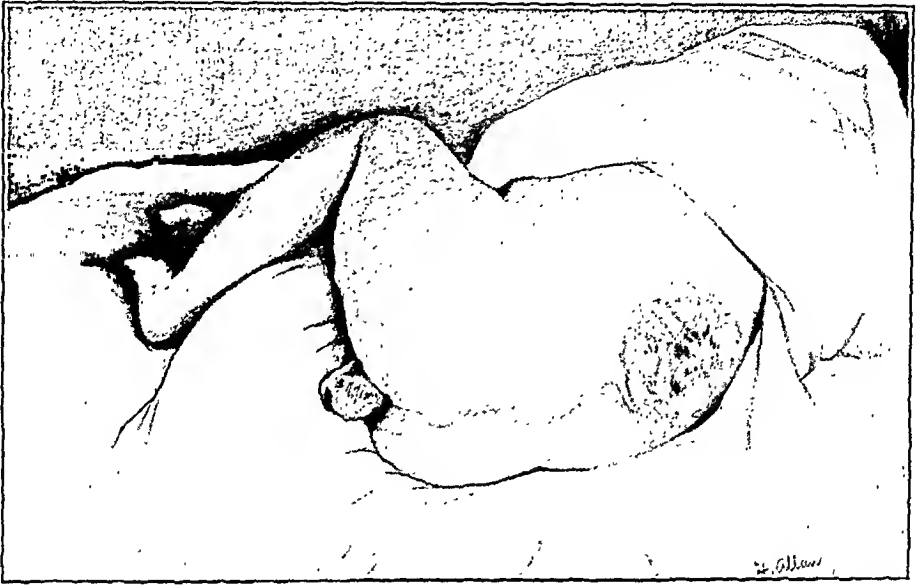


Fig. 1.—Posterior view showing meningocele and protruding cervix.

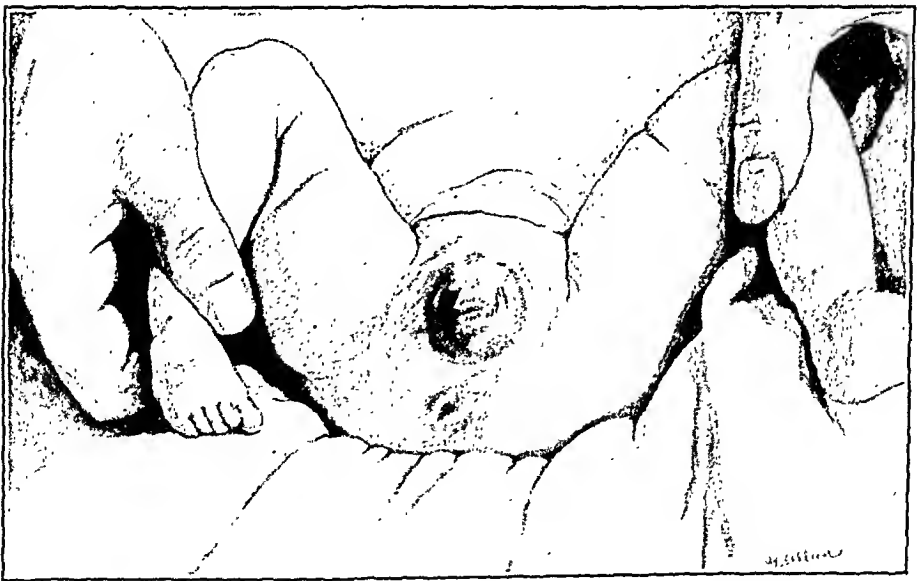


Fig. 2.—Perineal view showing complete prolapse of vaginal walls and bulging anus.

and voluntary motion seemed entirely lacking. Moderately severe stimulation of the sole of the left foot, however, resulted in a mass reflex involving all of the flexors of the left lower extremity and the lower third of the left rectus muscle. There was no apparent dribbling of urine, but the anal sphincter was lax and patulous.

Death occurred on the following day, twenty-two days after birth, presumably from transverse myelitis and septicemia. Autopsy was not obtained. (Figs. 1 and 2.)

Observation of this case stimulated me to investigate the literature in quest of other similar ones. While spina bifida is a relatively rare condition, estimated by Chaussier as occurring about once in one thousand births, the presence of uterine prolapse in association with it is apparently very much less frequent.

I have been able to find authentic reports of only twenty-four bona fide cases altogether and none since 1915. Of these only eight were published in the English language.

The first case was reported by Conovins in 1723, but no further reference to the condition was found until 1856 when W. H. Byford reported three cases. All three infants died within twenty-one days after birth. No explanation regarding the etiology of the prolapse was suggested.

During the following year Leach reported a case in which the prolapse occurred on the day after delivery. The lower limbs were paralyzed and death resulted supposedly from cerebrospinal meningitis after about three weeks.

In Quisling's case reported in 1889 the prolapse appeared on the eighth day, the child dying on the sixteenth. Here the perineum was said to be well developed, and the author believed there was no causal relationship between the spina bifida and the prolapse.

Schaeffer's case, reported the year after Quisling's, was a premature infant with an incomplete prolapse. When death occurred is not stated.

In 1894, Heil and Remy each reported a case. In one (Heil's) the sensibility of the lower limbs was disturbed and the reflexes and electrical reactions were abnormal. In the other the prolapse was not observed until the sixth day when it was entirely outside the vulva with the vagina turned inside out, but there was no rectal prolapse. Death occurred on the tenth day. Autopsy revealed no reason for the prolapse, but because of the spinal deformity the author attributed it to interference with the innervation of the parts.

Three cases were reported in 1897. (Hanssen, Ballantyne and Thomson, and Krause.) In Hanssen's case the prolapse occurred on the second day. There was also some protrusion of mucous membrane from the anus, which was open. The spinal tumor was operated upon, but the child died on the ninth day. He considered the prolapse a consequence of the spina bifida but believed that in this case it was of central nervous origin.

Ballantyne and Thomson obtained a very complete necropsy of the case reported by them, frozen sections of the pelvis being made and drawings compared with the pelvis of a normal female infant. They found that in the infant with prolapse the diameters of the false pelvis were below normal while those of the true pelvis were distinctly above the average.

Autopsy of Krause's case led him to believe that there was abnormal development and insufficient nourishment of the pelvic organs, poor development of connective tissue, lack of fatty tissue and flaccidity of the ligaments and muscles of the uterus.

In 1898, four cases were reported. (Doléris, MacVicker, Perignon and Radwansky.) One of these (Radwansky's), however, cannot be included, as no mention is made of spina bifida being present. The child was delivered by a midwife and seen by Radwansky on the following day when the cervix protruded for a distance of 4 cm. Reposition was accomplished with some difficulty and recurrence was prevented by compress and bandage for a few days, the uterus remaining in its normal position thereafter. Six months later the genitals were perfectly normal on inspection and palpation. No abnormality, aside from the prolapse, was noted in this infant, but a spina bifida occulta cannot be ruled out as this was before the common

use of the x-ray. In the other three there existed double club-foot and paralysis of both lower extremities. In Doleris' case the anus was deformed with the mucous membrane protruding, and the last two lumbar and first sacral vertebrae were absent. Death occurred on the fourth day. In MacVicker's case the buttocks formed a pyramid with the anus at the apex. The child lived seven days, and at autopsy a section of the tissues of the gluteal region showed complete absence of muscular fibers. The author regarded this muscular weakness as the most potent factor in causing the prolapse. Perignon's patient was seen by him only once but was reported to have lived several weeks.

During the next ten years, from 1899 to 1909, reports of seven new cases were made: Purefoy, Jahn, Andrews, Burger, Walterhöfer, Nussbaum, and Parache each citing one case. Four of the infants died within fifteen days after birth, one lived eleven weeks, one four months, and the other died but the age was not stated. In this case the prolapse and the spinal defect were the only abnormalities. All but one had some deformity of the feet, and in three hydrocephalus was present. In Jahn's case the sacrum was defective in such a manner as to make the pelvis very small, and the author for some reason thought the prolapse was due to the narrow pelvis. Autopsy of Burger's infant showed the levator ani muscles to be completely degenerated, and he regarded this developmental defect as the cause of the uterine prolapse. Walterhöfer's case is of interest because, during an attempt to replace the prolapsed uterus, the bladder was ruptured. At the autopsy a communication was found between the bladder and the interior of the spinal canal. Nerves and blood vessels passed through this opening and spread out on the inside of the bladder wall. Nussbaum in a thesis published in 1908 reported his own case and reviewed some fifteen previously reported cases. He considered the spina bifida the indirect cause and the paralysis caused by it, with atrophy of the muscles of the pelvic floor, the direct cause of the prolapse. Parache's case was the one previously referred to as being free from abnormalities other than spina bifida and prolapse. The spinal lesion was in the lumbosacral region as in most of the others, but there were no paralytic symptoms in the sphincters or lower extremities, and the perineum was in perfect condition. This author considered the explanation of the interrelation of spina bifida of the lumbosacral region and prolapse impossible for, according to Gowers, the nerves governing the muscles of the perineum have their motor roots at the level of the third and fourth sacral vertebrae. However, spina bifida at this point has not been found to cause prolapse of the uterus.

Radwanska and Mayerhöfer each reported a case in 1913. One of these was first seen when three months old and was successfully operated upon for the spinal tumor. The associated prolapse was the only other abnormality except poorly developed or atrophied levator ani muscles. After leaving the hospital the child was lost track of, so the final outcome is unknown. Details of the other case are not given except to mention the presence of some cranial defect along with the spinal and uterine conditions.

Two years later Ebler and Duncker reported a case and in an extensive review of the literature cited sixteen previously recorded cases. Several of these are not included in this paper as no detailed reports or references were given. Their own patient was operated upon when eight days old for cure of the spinal tumor, but it died from meningitis fifteen days later. Microscopic study of the perineum showed it to be thin and infiltrated with fat. The individual muscle fasciculi were extremely small and in places almost like connective tissue.

A case reported by Thaler in 1916 does not properly belong in this group because of the fact that examination was not made until the menses had been established two years and the duration of the prolapse was not known. It is of interest, how-

ever, inasmuch as inspection and palpation of the sacral region revealed nothing unusual, but radiologic examination showed a congenital cleft in the first sacral vertebra.

A review of the cases reported leads one to conclude that the spina bifida is the primary etiologic factor in the occurrence of the prolapse. It would appear that if certain of the sacral nerves are drawn into the spina bifida there is a partial or complete paralysis of the musculature of the pelvic floor resulting in secondary atrophy.

On account of the high mortality in cases of spina bifida aperta, uterine prolapse associated with this condition is of little practical interest but, inasmuch as present methods of diagnosis prove that spina bifida occulta is much more frequent than was previously suspected, a thorough search for this condition in all cases of uterine prolapse in which the etiology is not evident may throw some light on the subject.

Ebeler and Duncker state that a study of 28 cases of uterine prolapse showed spina bifida occulta in over 28 per cent, whereas an equal number of women without prolapse used as controls showed the condition in only 10 per cent. Further investigation of this interesting phase of the subject would seem to be warranted.

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# SPINAL ANESTHESIA IN GYNECOLOGY, WITH A REPORT OF FIFTY CASES\*

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(*From the Clinic of the Woman's Hospital*)

IT IS occasionally necessary to perform major plastic operations on elderly patients who present contraindications to general anesthesia. In these cases spinal anesthesia has a very definite application. Furthermore, in preference to other methods of local anesthesia, it can be used to great advantage in many intrapelvic operations.

Spinal anesthesia was first used by Corning in 1885. At that time it was taken up enthusiastically both in this country and abroad, but, because of the frequent fatalities and the numerous postanesthetic sequelae, it soon fell into disrepute. These bad results were due to faulty technic, improper instruments, inaccurately prepared solutions of highly toxic drugs, improper selection of patients, and lack of knowledge of the proper care of these patients after the administration of the anesthetic. At the Woman's Hospital previous to 1924, there had been only two patients operated upon under this method, but with the many improvements that have taken place during the past five years, it has been taken up again, and fifty patients have been operated upon with spinal anesthesia during the past sixteen months.

## PREOPERATIVE PREPARATION

The success of this method of anesthesia depends on four factors: the preoperative preparation, the technic, the care during operation, and the postoperative treatment. The preparation of the patient consists in explaining on the day before operation why this method is to be used; for instance, if she has some cardiac or pulmonary lesion, it is impressed on her how much safer it is not to have a general anesthetic and how much smoother her postoperative convalescence will be. She is told what to expect during the operation and how she is to conduct herself and, if possible, she is encouraged to talk to some other patient already operated upon under spinal anesthesia. The next day, one hour before operation, she is given  $\frac{1}{6}$  grain of morphine and  $\frac{1}{300}$  grain of scopolamine hypodermatically, which eliminates fear and discomfort from the strained position during operation. These details, seemingly insignificant, are essential for a successful anesthesia.

\*Read at a meeting of the Section on Obstetrics and Gynecology of the New York Academy of Medicine, May 1, 1925.

## INSTRUMENTS

In performing lumbar puncture, it is necessary to use a fine gauge needle, so that the opening in the dura readily closes and prevents leakage of the solution out of the spinal canal. Also, the needle should have such a short bevel, that after passing through the dura, it will not come in contact with the cord, and it should have a properly fitted stylet. At the Woman's Hospital, Doctor Labat's needles and syringe are used. These needles fulfill the above requirements, are made of nickel, and are unbreakable. The syringe, the glass barrel of which is graduated up to 10 c.c., has, at the proximal end, a strong metal shoulder which affords a firm grasp for the fingers; at the distal end, an eccentric tip for connecting and a bayonet lock for fixing the needle. Two needles and the syringe are sterilized by boiling for ten minutes in plain water; they are allowed to cool and are dried before being used.

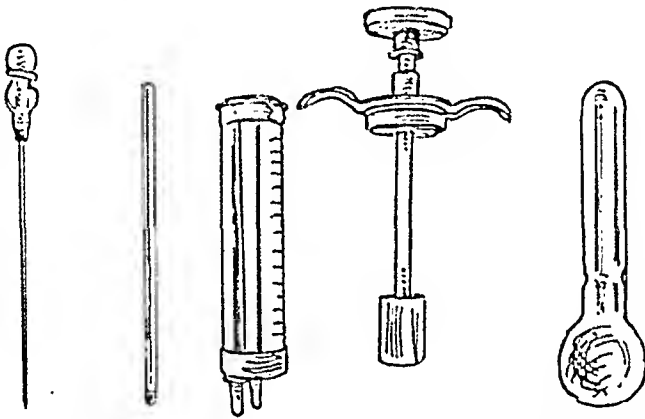


Fig. 1.—Showing needles, syringe, and glass bulb with drug.

## ANESTHETIC AGENT

It is important that the safest possible drug be used for introduction into the spinal canal. Of the commonly used local anesthetics, novocaine is the least toxic and the most effective. At the Woman's Hospital, neocaine, a French preparation of novocaine, is used. The drug is in crystal form and is put up in ampules containing accurate doses of ten and twelve centigrams; the former for patients weighing 150 pounds or less, and the latter for those weighing more than 150 pounds. When ready for use, the ampule is sterilized by immersion in alcohol for ten minutes; the top of the ampule is removed, and the bulb containing the novocaine crystals, which has a capacity of three cubic centimeters, is filled with spinal fluid to dissolve the drug.

## PREPARATION OF PATIENT

As soon as the patient arrives in the operating room she is placed in a sitting position across the table with the head and back arched forwards. A wide area, extending from the angles of the scapulae to the



level of the sacrocoecygeal joint, is painted with iodine and surrounded with sterile towels. In the meantime, the anesthetist has had the instruments and the ampule containing the drug sterilized and made ready for use.

#### SITE OF PUNCTURE

The site of puncture of the spinal canal depends on the extent of anesthesia required and the operation to be performed; for any vaginal operation injection between the second and third lumbar vertebrae, and for any abdominal operation injection between the twelfth dorsal and first lumbar vertebrae gives satisfactory results.

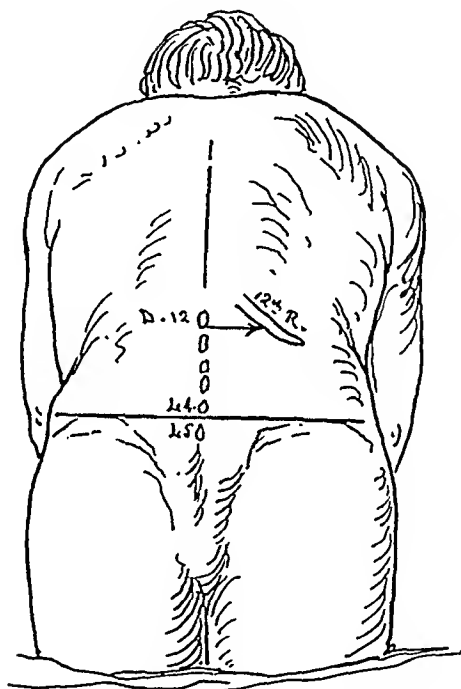


Fig. 2.—Showing anatomic landmarks for spinal anesthesia.

#### LANDMARKS

To locate the desired level at which the solution is to be introduced, two important landmarks, the twelfth rib and the crest of the ilium, must be noted. The twelfth rib on either side is located at its anterior extremity and traced towards the median line of the back; a perpendicular, measuring 5 cm., dropped from a point on this rib to the median line indicates the site of the twelfth dorsal vertebra. A horizontal line joining the highest points of the iliac crests either passes over the fourth or between the fourth and fifth lumbar vertebrae. Also, by slowly passing the second finger over the median line, from above downward, the alternating elevations of the spinous processes and the depressions of the intervertebral spaces can be appreciated.

## TECHNIC

Following Labat's technic, the skin over the desired intervertebral space is stretched between the thumb and second finger of the left hand, while the first finger indicates the exact median line. With the right wrist of the operator supported against the back of the

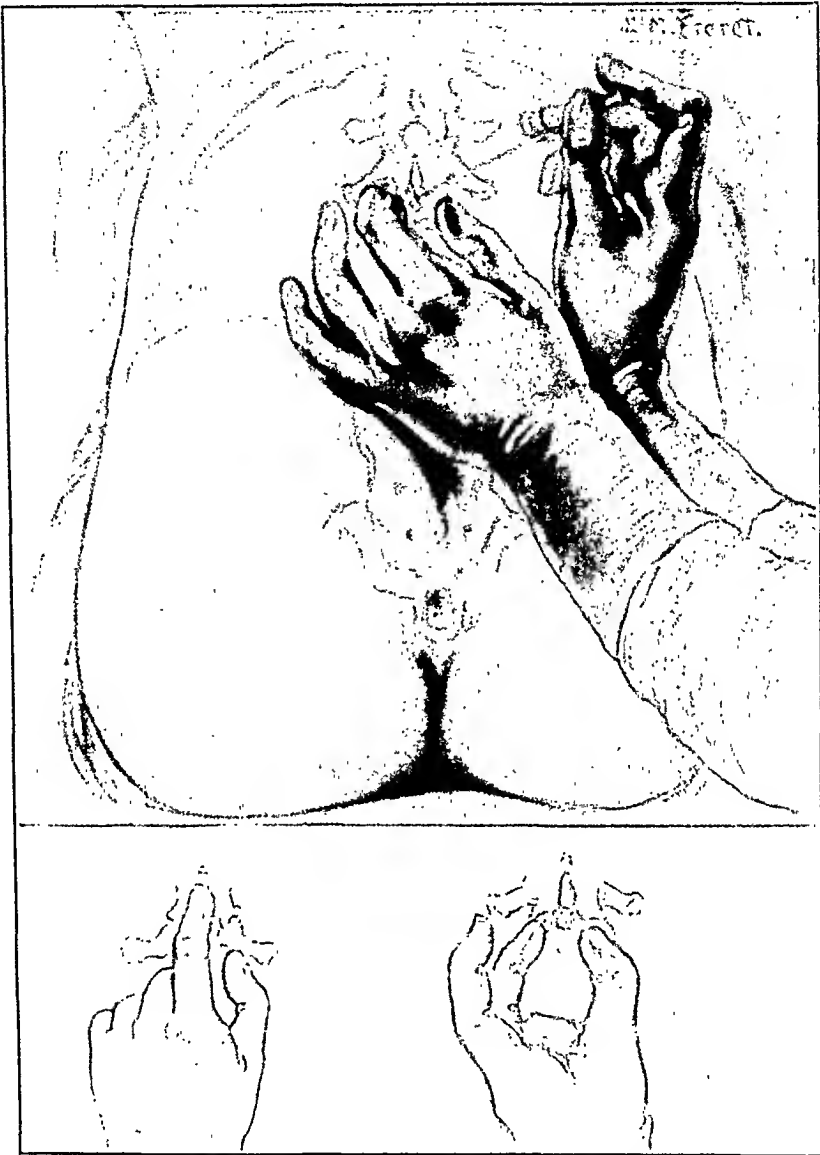


Fig. 3.—Showing method of injecting spinal anesthesia.

patient, the needle, held in the exact median line and perpendicular to the surface, is introduced through the skin with a quick thrust. It is very slowly and carefully advanced through the interspinous ligament until the dura is punctured when a very definite sensation, as of a needle passing through a thin, stiff piece of paper, is imparted to the fingers. The stylet is removed from the needle and the bulb containing the novocaine crystals is filled with spinal fluid, taking care

not to lose any more fluid than is necessary. The novocaine crystals are readily dissolved by aspirating the fluid back and forth in the syringe; the solution is then drawn into the syringe and the air is expelled. The syringe, with its plunger supported by the thumb, is held in a horizontal position while the aspirating needle is disconnected. It is then connected with the intraspinal needle and care should be taken not to dislodge its position in the canal. To dilute the solution and to be certain that the needle is still in the canal, one or two cubic centimeters of spinal fluid are drawn into the syringe. The solution is slowly injected; and, at the completion of the injection, the needle with the syringe still attached is rapidly withdrawn from the spinal canal. With this technic the spinal puncture is done neatly, without injury to the cord or its blood vessels, and with little discomfort to the patient.

As the solution is injected very slowly and with slight pressure there is but little diffusion within the canal; and, being absorbed at the site of puncture, it produces at that level a physiologic section of the posterior nerve roots. The result is complete anesthesia of the portions of the body supplied below that level. The anesthesia begins almost immediately and the average duration is one hour.

#### CARE DURING OPERATION

With the completion of the intraspinal injection, the patient is immediately placed flat on her back and with the head lowered. This position increases the circulation in the brain and counteracts the bad effects which occasionally occur from anemia of the bulb. The arms, instead of being placed under the hips as is usually done, are placed in a comfortable position across the chest. Everything is done to promote the comfort of the patient, for frequently she complains more of her uncomfortable position than of the entire operation.

Throughout the operation a careful record is kept of the pulse and respirations. No cardiac or respiratory stimulants are given routinely; but if the patient should show signs of cardiac or respiratory collapse, caffeine and adrenalin may be given hypodermically. Although, during operation, spinal anesthesia eases should be carefully watched and cared for, but little actual treatment is necessary.

#### POSTOPERATIVE CARE

When the operation is finished the patient is transferred from the operating table to her bed while in the Trendelenberg position; for occasionally the sudden changing of her position at the end of operation causes fainting and circulatory collapse. The foot of the bed is kept elevated for two hours; and, at the end of that time, if the patient's blood pressure is normal, the bed is leveled. One hour after

operation she is given a cup of coffee or water by mouth. Should her condition be serious, however, the coffee is given *per rectum* immediately. At the end of two hours the patient is allowed liquids, and on the following day, soft diet.

Following operation the pulse and respirations are recorded every fifteen minutes until the patient's condition is satisfactory. The majority of these patients have a smooth and uninterrupted convalescence.

#### INDICATIONS

In gynecologic surgery spinal anesthesia is indicated whenever there are contraindications to general anesthesia. In elderly patients, on whom major plastic operations must be performed, it is often a method of election.

#### CONTRAINDICATIONS

The only contraindications to the intraspinal method are blood pressure below one hundred, and a deformed spine; at times, even in these cases, it becomes necessary to resort to spinal anesthesia.

#### ADVANTAGES

In pelvic surgery, the complete muscular relaxation, flaccid bowels, and decreased bleeding add to the efficiency and rapidity of the operation; while in plastic surgery, the decreased bleeding is a distinct advantage over general anesthesia.

The slight postoperative distention, decreased vomiting, lessened pain, and the rarity of lung and kidney complications contribute to a normal postoperative course. In other words, although patients operated on with spinal anesthesia have more or less discomfort and at times slight pain during the operation, they certainly have a much safer and smoother convalescence.

#### ANALYSIS OF CASES

In this series of fifty cases the average age was forty-six years, the youngest was twenty-five, the oldest seventy-two. Thirty-two of the fifty cases were over forty years of age. Spinal anesthesia was an elective method in thirty-three cases; twenty of which had plastic operations, and of these seventeen were in women over forty. This method was used in the remaining seventeen cases because of the following indications: chronic myocarditis, chronic nephritis, hypertension, angina pectoris, pulmonary tuberculosis, emphysema, asthma, diabetes, and acute nasopharyngeal infection.

The cases were classified, according to the operation performed, as vaginal, abdominal and combined vaginal and abdominal. Thirty-one cases had vaginal, fifteen cases abdominal, and four cases combined operations.

Of the thirty-one vaginal cases, eight had vaginal hysterectomies; seven had interposition operations; thirteen had major plastic operations (dilatation and curettage, amputation of the cervix, operation for cystocele and rectocele, and perineorrhaphy); one had a dilatation and curettage with insertion of radium; one had a dilatation and curettage for therapeutic abortion, and one had radium inserted for epithelioma of the vulva.

Of the fifteen abdominal cases, ten had supravaginal hysterectomies, two had operations for umbilical herniae, one for a femoral hernia, one had a hysterotomy with sterilization, and one case had spinal anesthesia twice for a two-stage Mikulicz operation.

Of the four combined cases, two had a dilatation and curettage, amputation of the cervix, bilateral salpingectomy and appendectomy; one had a perineorrhaphy, myomectomy and appendectomy; and one had a dilatation and curettage, operation for retroversion and appendectomy.

TABLE OF OPERATIONS PERFORMED WITH SPINAL ANESTHESIA

	NUMBER OF CASES		RESULTS		
	SUCCESS	PARTLY SUCCESS	FAILURES		
<i>Vaginal Operations</i>					
Vaginal hysterectomies -----	8	6	2	0	
Watkins' interposition -----	7	6	1	0	
Dilatation and curettage, amputation of cervix, repair cystocele and rectocele, perineorrhaphy -----	12	11	1	0	
Insertion of radium—malignancy of vulva -----	1	1	0	0	
Dilatation and curettage, insertion of radium -----	1	1	0	0	
Dilatation and curettage for therapeutic abortion -----	1	1	0	0	
Removal of urethral hemorrhoid----	1	1	0	0	
<i>Abdominal Operations</i>					
Supravag. hysterectomy -----	10	7	3	0	
Repair umbil. hernia-----	2	2	0	0	
Repair femoral hernia-----	1	1	0	0	
Hysterotomy, resection of tubes----	1	0	0	1	
Mikulicz operation—two stages----	1	1	0	0	
<i>Combined Operations</i>					
Dilatation and curettage, amputation of cervix, bilateral salpingectomy, appendectomy -----	2	0	0	2	
Perineorrhaphy, myomectomy, appendectomy -----	1	0	0	1	
Dilatation and curettage, appendectomy, operation for retroversion -----	1	1	0	0	
Total -----	50	39	7	4	
		(78%)	(14%)	(8%)	

## RESULTS

The average duration of the anesthesia was one hour, but in one case it was complete for ninety and in another for seventy minutes. To prolong the anesthesia in two difficult cases that had vaginal hysterectomy, caudal anesthesia was successfully combined with the intraspinal method.

It is interesting to note the number of cases that did not vomit during or after their operation. Of the thirty-one patients that had vaginal operations, twenty-one did not vomit, while ten vomited an average of three times. Of the nineteen patients that had abdominal and combined operations, nine did not vomit, while ten vomited an average of four times. Of the fifty patients that had either vaginal, abdominal, or combined operations, a total of thirty, or 60 per cent, did not vomit.

Abdominal distention was practically negligible in those patients who did not vomit, and in those who did, it was not so troublesome as the distention following general anesthesia.

The results of the anesthetics were classified as successful, partly successful, and failures. The successful cases were those that did not require any other anesthetic. The partly successful cases were those that required, mostly for its psychic effect, a small amount of open drop ether at the beginning or end of operation. None of the partly successful cases had more than one and one-half ounces of ether nor were they at any time unconscious. The failures were those cases that required a general anesthetic subsequent to the intraspinal method.

Of the thirty-one cases that had vaginal operations, twenty-seven, or 87 per cent, were successful, and four cases, or 13 per cent, were partly successful. There were no failures. Of the fifteen cases that had abdominal operations, eleven, or 73 per cent, were successful; three cases, or 20 per cent, were partly successful, and one case, or 6 per cent, was a failure. Of the four cases that had combined operations, one, or 25 per cent, was successful, and three, or 75 per cent, were failures. This makes a total of thirty-eight cases, or 78 per cent, successful; seven, or 14 per cent, partly successful, and four, or 8 per cent, failures. There were no fatal cases nor were any of the patients at any time in a serious condition.

It is obvious from these results that, on the one hand, spinal anesthesia gives excellent results in vaginal and satisfactory results in intrapelvic surgery, and on the other, that the results in combined operations are very uncertain.

It is probable that changing from the lithotomy to the supine position, the resultant loss of time, the consequent stirring up of the patients, and that the abdominal incisions, through very sensitive

structures, were made when the anesthetics were beginning to wane, accounts for the failures in those patients that had combined operations.

Considering the uncomfortable position of these patients during vaginal operations, that all of the operations with the exception of four lasted from fifty to seventy minutes, and that many of the operations were very difficult, the anesthetics were put to a severe test.

#### CONCLUSIONS

1. That spinal anesthesia is a rapid, effective anesthesia and conducive to a normal convalescence.

2. With the correct technic and the proper selection of patients, the increased safety of spinal anesthesia seems to justify its more liberal use.

3. When general anesthesia is contraindicated in women requiring gynecologic surgery, either plastic or abdominal, spinal anesthesia gives excellent results.

4. In plastic gynecologic surgery in elderly women spinal anesthesia should be more often used as an elective method.

For the privilege of carrying on this work I desire to express my appreciation to Dr. George Gray Ward, Chief Surgeon to the Woman's Hospital, and also to Dr. Gaston Labat, Consulting Anesthetist to the Woman's Hospital, for their kindness and patient instruction.

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## OBSERVATIONS ON THE USE OF CASTOR OIL, QUININE, AND PITUITARY EXTRACT IN THE INDUCTION OF LABOR

BY ALBERT MATHIEU, M.D., F.A.C.S., PORTLAND, OREGON

THE value of castor oil, quinine and pituitary extract in the induction of labor has not received the proper recognition by obstetricians, notwithstanding the contributions of Watson<sup>1, 2</sup> and others. Additional data will probably be welcome.

Regardless of propaganda for prenatal care and the great volume of matter written on the subject, sufficient stress has not been laid on the one safe method of combating and defeating many of the abnormalities found during the prenatal period and at term.

The probable reason induction of labor is rather reservedly used by obstetricians, and scarcely thought of by the general practitioner, is its formidableness when done with bags or bougies. The dangers of the bag and bougie are numerous. Intrauterine manipulation, early rupture of the membranes, dislodgment of the presenting vertex, the occasional concealing of hemorrhage, prolapse of the cord, maceration of the cervix and the jeopardizing of the patient in case cesarean section has to be resorted to, do not obtain when the induction is made with castor oil, quinine and pituitary extract.

Much of the advantage of prenatal care is lost when one allows the head of the fetus, by sheer growth, to reach a stage of marked disproportion with the pelvis of the mother who carries it, when induction will avoid this complication.

Women with histories of rapid or precipitate labors, or with thin, dilated cervixes at term, should not be allowed to suffer precipitate labor while on the way to the hospital. Nor should those with toxemia, progressive, in spite of treatment, be further endangered by delay. The woman at term who is suffering distress and discomfort due to pain, pressure, insomnia and nervous anxiety, should not be permitted to reach the stage of exhaustion because one wishes to let Nature take her course. Nor is it good obstetrics to allow a woman near term, whose membranes are ruptured, to go longer than twenty-four hours without inducing labor.

The following series of cases is analyzed and offered as additional corroborative evidence of the value of castor oil, quinine and pituitary extract in the induction of labor. This series is composed entirely of cases from my private practice, who had strict and active prenatal care and who were under close observation during the antenatal, natal and postnatal periods. This series also comprises all of the inductions done by me in the last five years. None have been omitted.



There are 91 cases in all, 52 primiparae, and 39 multiparae. Eighty-eight of the inductions were successful (96.7 per cent), in three it failed (3.3 per cent). The failures were all in primiparae.

#### INDICATIONS

In this series of 91 cases the indications are shown in Table I.

TABLE I

Postmaturity	30
Large baby*	16
Distress and discomfort*	8
Fear of precipitate*	4
Premature rupture of membranes*	8
Multiple fibroids*	1
Toxemia	11
Large baby at term	8
Premature rupture of membranes	3
Bilateral pyelitis	1
Chronic pulmonary tuberculosis	1
	91

\*These cases were also postmature.

#### METHODS

The method used is a modification of the method described by Watson. I have overcome the main objectionable feature of the Watson method by reducing the dose of pituitary extract to three minims. This dose seems to be less harsh and I have never found it to raise the blood pressure more than five points. I have also attempted to concentrate the actions of the castor oil, quinine, and pituitary extract and the enema in such a way as to make their actions more or less simultaneous. I have also used a greater number of injections of pituitary extract before conceding failure. This modification I think has given a slightly higher percentage of successes. The method is as follows: In the hospital, the patient is given two ounces of castor oil and ten grains of quinine sulphate and exactly two hours afterward, a hot soapsuds enema is given and as the enema is about to be expelled, three minims of pituitary extract are given by hypodermic. This same dose of pituitary extract is repeated by hypodermic every thirty minutes until labor starts and *no longer*. From then on, the labor is conducted as though the onset had been normal. Failure is admitted and the procedure stopped if eight hours pass without labor being started or if there is absolutely no sign of any effect toward the induction or if the continual use of the hypodermic is too trying to the mother. In such cases, the procedure is stopped, the mother is given an hypnotic or sedative and after twenty-four or forty-eight hours, the induction is again started.

In only eight cases, because of urgency and with the cooperation of the mother, were more than twelve hypodermic injections of pituitary extract given. Nearly all of these inductions were made by my own special nurse, who remained with the patients during the induction and subsequent labor. This nurse has reached a high state of efficiency in the recording of the fetal heart, rectal examination and in noting the progress of the induction and the labor. There were some cases in which labor had apparently started but in which after an hour or two, the contractions had disappeared entirely. In these cases the injections of pituitary extract were started again in the routine manner.

### FAILURES

In the entire 91 cases in this series, there were three failures; all in primiparae, 3.3 per cent. The cases in which the induction with castor oil, quinine and pituitary extract were unsuccessful are detailed below.

CASE 1.—The indication in this case was a large baby with the head floating, at term, in which I was unable to fit the head into the pelvis; and the routine was stopped after 14 injections of pituitary extract without regular contractions. Labor began normally forty-eight hours later and was followed by a normal delivery. The baby weighed 4390 grams, and there was no morbidity of mother or child.

CASE 2.—The indication was a large head that could not be fitted into the pelvis. After the second attempt at induction, the head fitted well into the pelvis. Labor commenced normally six days later and was terminated with a left lateral episiotomy and low forceps. The baby weighed 4200 grams, and there was no morbidity in mother or child.

CASE 3.—The indication was a severe recurrent bilateral pyelitis due to colon bacillus infection. This patient was in a very serious condition, but because of religious beliefs, induction was prohibited until the period of viability arrived. There were two failures with castor oil, quinine and pituitary extract, and then bagging was resorted to because of the urgency, and was successful. The baby weighed 2324 grams. There was postpartum morbidity of the mother in this case due to the pyelitis and the case is again considered under "morbidity."

### MORBIDITY

There were four cases of morbidity (patients who had rises of temperature up to  $100.4^{\circ}$  on two different days). (4.4 per cent.)

CASE 1.—This patient had lost her first baby at birth because of toxemia. She had chronic nephritis and developed severe toxemia in the last month of pregnancy. Treatment for two weeks in the hospital did not control the toxemia, hence, labor was induced. The first effort at induction failed, but the second was successful, and she had a normal delivery. The baby was born in good condition and weighed 3370 grams. The patient developed a mild degree of phlebitis of the right leg and left the hospital in the sixth week with her baby; both in good condition.

CASE 2.—This woman had severe bilateral pyelitis from the fifth month of pregnancy and was in the hospital from that time until her baby was born. Because of religious beliefs induction was prohibited until the period of viability arrived.

There were two failures with castor oil, quinine and pituitary extract and the bag was resorted to because of urgency. The baby was delivered by low forceps and left lateral episiotomy. There was a recurrence of the pyelitis four days after the delivery but this very soon improved and the patient left the hospital in the fourth week in good condition. Baby weighed 2324 grams at birth and left the hospital with the mother; both in good condition.

CASE 3.—This patient was delivered normally except for a median episiotomy. She had a temperature on the fourth day of  $101.6^{\circ}$  and on the sixth day a temperature of  $100.4^{\circ}$  due to nonsuppurative mastitis.

CASE 4.—Labor was induced in this patient because of contracted pelvis. After a test of labor of many hours, a cesarean section was done because the head did not engage or could not be fitted in and definite disproportion existed. She suffered considerable primary shock. On the fifth day, after a chill, her temperature rose to  $104^{\circ}$ . On the sixth day there was another chill and a fever of  $105^{\circ}$ . At this time colon bacillus was found in a cultured, sterile collected specimen of urine. There seemed to be no other basis for the fever. Following treatment, she improved at once. She left the hospital in the third week with her baby, both in good condition.

In the total series of 91 cases, there was no morbidity of the babies which could be attributed to either the induction or the type of delivery and there were no maternal deaths or fetal deaths, either early or late.

#### SUCCESSSES

Sixty-two inductions were successful on the first attempt, twenty were successful on the second attempt and six required three attempts before success was obtained.

In 39 multiparae, all of which were successful, the average number of hypodermic injections of pituitary extract necessary was six and one-half; and in 52 primiparae, the average number of injections in the successful cases was six; and in the failures, ten and one-half. The multiparae averaged three and eight-tenths hours in labor, the longest labor being nine and one-half hours; the shortest being three-quarters of an hour. In 52 primiparae, the average hours of labor was nine and one-tenth. The longest labor was twenty-two and one-half hours; the shortest, two hours.

#### CONCLUSIONS

In this series of 91 cases in which induction of labor was successful in 96.7 per cent with castor oil, quinine and pituitary extract, there were no maternal deaths and no fetal deaths, either early or late.

There were eight cases in which there was early rupture of the membranes (after labor had commenced but before the cervix was dilated two fingers). This had no bad effect on the labors, and there was no morbidity. The longest labor in this group was eight and one-half hours in a primipara, and the shortest was one hour in a multipara.

There were two cesarean sections in the series; in both of which was a serious doubt as to whether or not the patients could deliver due

so disproportion and inability to fit the head into the pelvis. They were both primiparae and induced at term with the idea of giving them a test of labor. One was a woman of eighty-five pounds, with a just minor pelvis and hydramnios; after having been in hard labor for four hours, with the cervix dilated to four fingers, the head was still floating and could not be fitted into the pelvis. The other was a short, stocky woman with a funnel type pelvis; after several hours of real hard labor, the head had not engaged and could not be made to engage. The first made an uneventful recovery, and the second is detailed as Case 4, under the heading "morbidity."

The termination of labor in the entire number of cases was as follows: normal thirty-three; low and midforceps, fifty-one; version and breech extraction, five; cesarean section, two. The average weight of the babies was 3848 grams, the largest baby weighed 4734 grams and the smallest 1927. There were twenty-three babies that weighed over 3800 grams and three that weighed under 2200 grams. There were 92 babies in all, one mother having twins. There were 91 vertex presentations, one of these having been converted from a breech presentation before labor, and one breech presentation.

In two of the three failures, the head which before labor was floating, could not be fitted into the pelvis, and showed signs of disproportion, fitted well down into the pelvis during the attempted induction and removed the indication for the induction.

It appears advantageous to modify the method of Watson by giving only three minims of pituitary extract instead of  $\frac{1}{2}$  to 1 c.c., and by giving the first dose of pituitary extract as the enema is being expelled, and furthermore, by continuing the attempt at induction over a longer time than he advises.

#### REFERENCES

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# IS THE SEDIMENTATION TEST OF PRACTICAL VALUE IN GYNECOLOGY?\*

BY PHILIP F. WILLIAMS, M.D., PHILADELPHIA, PA.

*(From the Gynecologic Service of the Graduate School of Medicine of the University of Pennsylvania)*

THE early work of Fahraeus and Linzenmaier on the phenomenon of sedimentation of the red blood cells as a method of diagnosis and prognosis has until fairly recently received but little attention in American literature. The mechanics underlying this phenomenon and the technic of the test have been so thoroughly discussed in the recent papers of Friedlaender, Baer, and Cherry, that they need not be repeated here. Suffice it to say that when an anticoagulant, as sodium citrate, is added to blood the red cells settle by gravity through the citrated plasma in varying degrees of rapidity depending upon the state of health of the individual, the acuteness of any infectious process present and the composition of the blood at the time the sample is taken, with reference to hemoglobinemia and hydremia. The time for sedimentation of the blood cells to the 18 mm. mark on the tubes recommended by Friedlaender in normal healthy individuals varies. Friedlaender estimates the time in normal women between 600 and 1000 minutes, which he states are lower than the normal figures obtained by Linzenmaier. Baer estimated the time in normal individuals to range between 130 and 224 minutes.

The earlier work in this line of research was upon the value of the phenomenon as a means of diagnosis of pregnancy, as it was found that in pregnant women a rather rapid rate of sedimentation occurred in contrast to healthy nongravid individuals. Practically the test was of little value as the quickening of sedimentation does not occur until pregnancy is so far advanced that there should be no unusual difficulty in making the diagnosis by physical findings. Upon attempting to use the method as one of differential diagnosis with some of the conditions commonly mistaken for pregnancy it was found to be of limited value, as some of these conditions showed as fast a sedimentation time as did pregnant women.

When the test was applied to other classes of diseases, particularly pelvic infections, the rate of sedimentation was found to correspond rather closely with the severity of the infection, in some instances apparently more closely than did the temperature curve or the leucocyte count. From this standpoint the method becomes one of un-

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doubted prognostic importance. In acute pelvic infections Friedlaender found the time of sedimentation to be very fast, and believes that the rapidity of sedimentation bears a direct relationship to the severity of the infectious process, and that it forecasts with a greater degree of accuracy the state of the pathologic process than either the temperature or the leucocytes. In comparison with other less frequently used means of prognosis in pelvic inflammatory conditions, such as the hematoelastic crisis test of Widal, capillary circulation and blood chemistry, it was found that much more reliance could be placed upon the sedimentation test. His study has led him to propound several postulates, namely, that with a sedimentation time of less than thirty minutes an active infection is present; with the time under one hour a latent infection exists, and operation should be deferred. But with a sedimentation time of over 120 minutes all possibility of a latent or active infection can be excluded and the patient can safely undergo operation.

From a study of the results tabulated in various articles it would seem that a most valuable application of the test would be in prognosticating the most favorable time for operation in pelvic infections. Here as Friedlaender states the temperature and the leucocytes may be normal after a period of conservative treatment and yet a stormy convalescence follow operative interference. Here he claims it is well to regard the sedimentation test as a barometer, and operate only after a sedimentation time of 120 minutes has been reached. Baer and Reis conclude that patients with pelvic inflammatory conditions should not be operated upon until a sedimentation of 45 minutes has been obtained. When this rule was disregarded and operation performed a rough postoperative period followed. Baer and Reis also feel that the time of sedimentation is directly proportional to the virulence of the infection and serves as a more delicate prognostic index than either the leucocytes or the temperature. Cherry feels that, while the test is simple and may yield information as to the progress of the infection more quickly than the leucocyte reaction, it has not in his hands indicated the degree of virulence of infection, nor has he found that a low time of sedimentation necessarily signifies that a bad prognosis should be given. He also feels that the leucocyte reaction, being less easily influenced and more stable, therefore more clearly and definitely indicates the proper time for operation.

With a view of studying this test as a means of prognosis it was added in October as a routine for all admissions on the gynecologic service in the Hospital of the Graduate School of Medicine and eighty cases were studied. The technic recommended by Friedlaender was followed, and the test was repeated with all leucocyte counts so that a comparative study might be made.

The test was applied in ten cases of myoma (Table I). The first case was one in which multiple subserous and a large extruded and gangrenous submucous myomata were complicated by peritonitis. Death occurred three days after admission. The second case was complicated by chronic purulent salpingitis, was operated upon, and did not have more than the usual febrile reaction to operation. The temperature was elevated to 101° once. This case was discharged eighteen days after operation. The third case was complicated by a severe anemia and a serious mitral regurgitation, the hemoglobin was 40 per cent and the red cell count 2,100,000. The operation was followed by an uneventful convalescence, and she was only in the hospital longer than usual on account of the anemia. From admission to discharge the sedimentation time only rose eight minutes. It is likely that in this instance the composition of the blood influenced the time of sedimentation. The other cases showing a low sedimenta-

TABLE I  
MYOMAS

S. T. IN MINUTES	LEUCOCYTES	TEMPERATURE
11	33,650	103
7	7,250	101
15		
23 (10 d. p. o.)	8,050	98
30	6,500	98
65	7,000	98
23	6,100	98
90	8,300	98
135	9,800	100
140	6,000	98
66	5,900	98

tion time did well after operation, there being no morbidity. It would seem therefore that in the five cases in which the test gave evidence of an acute infection being present no definite prognostic information was obtained.

The second chart (Table II) shows a series of miscellaneous gynecologic conditions. Both the cases of pelvic abscess were operated soon after admission. The temperature dropped at once, and was followed by some fluctuation as the pelvic debris sloughed away. The initial sedimentation times of 12 and 22 minutes rose in ten days each to 56 and 43 minutes. Two cases of vulvar abscesses opened at once showed initial readings of 10 and 27 minutes, which rose to 65 and 35 minutes in five days, when the patients were discharged. The second case had a subacute salpingitis and a positive Wassermann reaction; these factors may have retarded an expected rise in the time of sedimentation after the pus cavity was evacuated. The case of inguinal granuloma showed an initial reading of 3 minutes; this was confirmed

by a repeated test a few hours later. After the large vulvar growths were removed with the cautery, and antimony injections begun, the reading rose to 10 minutes. The large area of surface infection may have been the occasion of such a quick sedimentation time.

TABLE II

DIAGNOSIS	S. T.	LEUCOCYTES	TEMPERATURE
Pelvic Abscess	12	8,150	100
(10 d. p. o.)	56	7,000	99
Pelvic Abscess	22	11,400	103
(10 d. p. o.)	43		
Vulvar Abscess	10	10,500	101
(5 d. p. o.)	65		
Vulvar Abscess	27	10,000	99
(5 d. p. o.)	35		
Granuloma Ing.	3	7,200	98
(10 d. p. o.)	10		
Carcinoma Vulva	18	13,000	101
Bartholinitis Chronic	80	6,000	98
Tuberculosis of Vulva	55	7,300	98
Cystitis	67	7,400	100
Lacerated Perineum	216	6,800	98
Lacerated Perineum	128	8,800	98
Endometritis	46	14,000	99
Pelvic Adhesions	61	7,300	98
Ovarian Cyst (Infected)	240	14,600	102
Hydrosalpinx (Tuberculous)	40	7,200	98

In a group of cases of parturitional pathology the time of sedimentation was definitely lower in the febrile than in the apparently noninfected cases of abortion. In the cases of puerperal pyelitis the time was moderately low, 11, 15, 15 and 21 minutes, on admission, and did not show a marked rise coincident with the clearing up of the urine, the lowering of the temperature and a drop in the leucocytes. If all confidence might be placed in the test these figures would tend to show that an infection persisted in spite of the clearing up of the clinical picture. Two cases of pernicious vomiting showed readings of 56 and 120 minutes, while in four cases of toxemia of late pregnancy the time ran about 25 minutes in each. However, many cases of normal pregnancy run as low a time as this, and whether toxemia resulting from disturbed metabolism has the same influence as the toxemia from an infectious process on the sedimentation of red blood cells is not known.

It is in the infections and inflammations of the uterine adnexa that need arises for the most careful judgment as to the earliest opportune time for surgical interference. On our service for the most part conservatism is practiced up to a certain point, and operation deferred until the temperature has been normal or nearly so for some days, with a stationary or falling leucocyte count. Such observations coupled with the general clinical picture and the local physical findings have been our guides in determining when to operate. In such con-



ditions the addition of a trustworthy prognostic index, as simple in carrying out as the sedimentation test, would be quite welcome, were it to forecast the need for drainage, the possibility of postoperative peritonitis, ileus or other worrisome complication. In a group of thirty cases of chronic or subacute salpingitis, oophoritis and old pelvic peritonitis in which the temperature (not over 102°) and leucocytes (not over 12,500) were but moderately elevated on admission, several were found to have sedimentation times below 10 minutes, and

TABLE III  
CHRONIC OR SUBACUTE SALPINGITIS, S. T. BELOW 30 MIN.

	S. T.	LEUCOCYTES	TEMPERATURE	
1	6	10,350	102	
2	7	7,250	100	
3	7	6,400	99	
4	8	7,000	99	Postoperative Peritonitis
5	12	10,000	101	
6	15	7,600	99	
7	15	8,400	98	
8	21	8,000	101	
9	22	6,000	98	
10	30	6,200	100	

some others below twenty minutes (Table III). Yet all these women were operated upon with but one postoperative flare-up which caused any concern. This case of recurrent salpingitis after a pelvic débridement ran a postoperative temperature to 103° for three or four days, with marked distension and vomiting. She cleared up and was discharged with a negative pelvis on the twenty-second day after operation. Nor in these cases did the sedimentation time appear to be in entire accord with the nature of the pathology discovered at operation, for in several instances quite well-defined tuboovarian abscesses were found in cases which showed among the slowest time of sedimentation.

In a group of ten cases of salpingitis (Table IV), entering with well-marked pyrexia and with fairly elevated leucocyte counts and with a clinical picture of a much more acute process, the sedimentation time was 25 minutes or below in all but one case, denoting apparently the presence of a very active lesion. The sedimentation time in its rapidity was much more on a par here, than in the previous series, with the clinical picture and other observations. Operation was done in all these cases as soon as was feasible after admission. Drainage was used in but two cases. In only one case was there postoperative morbidity of note; in this instance a postoperative pelvic peritonitis was complicated by an acute upper respiratory process. No case remained in hospital more than twenty-one days after operation. In these cases the final sedimentation time taken before discharge did not show any marked rise, not reaching over 200 minutes

in any case. Whether the residual traces of inflammatory exudate present in the pelvis would account for this is uncertain. Indeed the final pelvic examinations were considered quite satisfactory in the way of immediate end-results.

TABLE IV  
ACUTE SALPINGITIS, S. T. BELOW 30 MINUTES

	S. T. ON ADMISSION	S. T. ON DISCHARGE	LEUCOCYTES	TEMP. AT TEST	POSTOPERATIVE MORBIDITY
1	15	55	16,000	103	none
2	25		14,000	102	none
3	22	38	18,000	101	none
4	20	63	18,000	101	none
5	15	40	19,600	102	drain—101
6	15	56	19,000	102	drain—102—cough
7	14	86	22,500	100	none—tuberculosis
8	80	200	18,400	102	none
9	15		15,000	100	none
10	10	20	13,000	100	none

Whether the sedimentation time would be lower in a first infection or in the flare-up of a recurrent attack of salpingitis was not determined, nor whether the sedimentation time was more rapid in the postabortal pelvic inflammations than in gonococcal salpingitis was not determined. It has been impossible to note any influence of latent syphilis upon the speed of sedimentation. In several instances it was possible that a rather marked anemia might have been partly responsible for the rapidity of sedimentation in cases in which such findings might not have been expected.

#### CONCLUSIONS

The sedimentation test, while simple and easy to carry out, has not seemed to be consistent in expressing the reaction of the body to the disease process nor to the nature of the pathology as found at operation.

A rapid sedimentation time has not been found to presage any unusual degree of postoperative morbidity.

In comparison with this test the temperature curve and the study of the leucocytes remain as more stable and reliable indices for diagnosis and prognosis.

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(For discussion see page 261.)

## NARCO LOCAL ANESTHESIA IN CESAREAN SECTION\*

BY F. E. KELLER, M.D., PHILADELPHIA, PA.

IT IS not within the scope of this paper to offer any suggestion for modification of operative procedure to be adopted in performing cesarean section nor to deviate to any great extent from the classical Säger operation. The type of procedure submitted will be detailed with defects as well as advantages. The technic is developed from successive cases, and I would assume that a dogmatic rule of thumb would not fit all cases, but that each must have a considerable amount of individual consideration and study before deciding upon the method of choice for that particular case.

Hence it seems hardly likely, notwithstanding suggestions to the contrary, that narco local anesthesia should be considered in all cases requiring delivery by this method. In a markedly prolonged operation such as the extraperitoneal section, or in cases of ruptured uterus or placenta previa, where time is a great factor, it would seem that a general anesthetic must remain the choice.

In all the patients whom I have subjected to narco local section, there has been, I believe, a contraindication to the use of ether. The conditions present have been as follows: chronic endocarditis and myocarditis with decompensation, chronic pulmonary tuberculosis, acute bronchitis with prolonged gestation, pyelitis with infection of the kidneys, hyperthyroidism, nephritis with deformity of the symphysis pubis, and influenza. The risk with cases of such type would be considerably higher and the chances of failure greater. The question of lessening the strain of labor has been the thought with some, and with all the factor of succeeding pregnancies has been of great moment, as practically all of them have been done for constitutional conditions, or other features which would render succeeding pregnancies a greater risk to the mother. In performing ligation of the tubes, it is usually necessary to deliver the fundus, hence this procedure makes some pain from traction on the broad ligaments. It is almost impossible to control this feature. Likewise no toilet of the peritoneum can be made without great pain to the patient. Too deep narcotization would obviate a part of these things but seems to offer a greater risk to the baby.

In preparation of patients, no enema or purgative is given. A dose of morphine sulphate gr.  $\frac{1}{6}$ , scopolamin hydrobromide gr.  $\frac{1}{100}$ , is given one hour before operation. At operation 0.5 per cent novo-

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\*Read at a meeting of the Obstetrical Society of Philadelphia, April 1, 1926.

caine solution is used by infiltration, endeavor being made to infiltrate the entire thickness of the abdominal wall before making incision.

The cases submitted are as follows:

CASE 1.—M. M., twenty-two years old, eight and one-half months pregnant. Chronic valvular endocarditis. Had been in bed for decompensation on three occasions before marriage, and has had "weak" spells through this pregnancy. Pelvic measurements slightly under normal, and baby not very large. A local section was performed to relieve her heart of the strain of labor and to ligate the tubes. Both mother and child recovered.

CASE 2.—J. J., thirty years old, pregnant at term, second pregnancy. First pregnancy transverse with prolapse of arm, delivery by version and extraction, secondary repair, prolonged stay in the hospital, development of pelvic abscess and recovery, moderate contraction of the pelvis. A section, in the interest of both mother and child, with ligation of the tubes was done. Mother and child recovered as in her first pregnancy, but the hospital stay in the second case was shortened to twelve days.

CASE 3.—K. R., twenty-nine years, eight and one-half months pregnant. Influenza, chronic pulmonary tuberculosis, scoliosis. Para iii. first and second children spontaneous. Section and ligation of tubes, with recovery of both mother and child.

CASE 4.—M. H., primipara, age twenty years. Congh, dyspnea, pregnancy of eight and one-half months, treated for heart condition for a number of years, and has been in a sanitarium for her "health." Diagnosis was pulmonary tuberculosis, chronic endocarditis; pregnancy. Operation, cesarean section, ligation of tubes.

CASE 5.—V. B., aged twenty-two years, primipara, shortness of breath, pain in region of the heart, fainting spells. Blood shows marked secondary anemia; urine, albumin, rbc. and a pure culture of colon bacillus; chest pulmonary tuberculosis. Pregnancy at seven months. Section with recovery of mother. The baby lived one hour. Diagnosis: nephritis, pyelitis, pulmonary tuberculosis.

CASE 6.—A. L., twenty-five years, para vii, diagnosis: pregnancy term, pulmonary tuberculosis, chronic endocarditis. Section, ligation of tubes. Recovery of mother and child.

CASE 7.—E. B., thirty-one years, para ii. Diagnosis: toxemia of pregnancy, pregnancy of eight months. The previous pregnancy was marked by toxemia, but not so severe as the present. Section with ligation of tubes, and recovery of mother and child.

CASE 8.—J. S., twenty-nine years, para vi. All deliveries very difficult. Chest aggravated during this pregnancy. Also development of what seems to be tuberculous enteritis. Patient had a previous suspension operation. Section at term with ligation of tubes. Mother and child recovered.

CASE 9.—J. S., forty-one years, para iv, youngest child nine years, complete repair including amputation of cervix five years ago. Cesarean advised if pregnancy ensued. Chronic interstitial nephritis with hypertension evident during this pregnancy. Delivered by section under local anesthesia with ligation of tubes. Recovery of both mother and child followed.

## CONCLUSIONS

It would seem that the following conclusions might be drawn from the foregoing cases:

1. The strain of labor may be lessened without greatly increasing the risk to the patient, by performing narco local cesarean for certain constitutional conditions.
2. Narco local anesthesia is far safer than ether or any other general anesthetic in most of these conditions.
3. It is better to perform sterilization in selected cases at the time, thereby saving the patient the necessity of another operation, either for ligation of the tubes or a therapeutic abortion in order to save her life.

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(For discussion see page 260.)

## THE FALLACY OF THE PRESENT TREATMENT OF THE POSTPARTURIENT BREAST\*

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FROM time to time, a form of treatment or a certain method will appear in medical literature and will be handed down from book to book on the subject to which it refers until its use becomes an established procedure seemingly beyond question. Such has been the case in the treatment of the nursing breast by the time-honored but fallacious method of washing with borie acid. Following the method established by general usage and current teaching, it was, in the past, our practice to order all breasts and babies' mouths on our service washed both before and after nursing with a saturated or four per cent solution of borie acid, and the nipples subsequently covered with a square of sterile gauze held in place by a properly adjusted binder. This has been our technic for a number of years and, although we felt that in doing as others were doing we had, to the best of our ability, safeguarded the interest of the nursing mothers under our care, we were annoyed to find that there would develop an occasional breast abscess. Furthermore, we were astonished to note that the private room case, with the entire time of a graduate nurse devoted to her needs, seemed to develop abscess of the breast more than did the patient in the ward who received only part of the time of a nurse in training. These observations caused us to carry out the following experiments:

First, we cultured the mouths of fifty nursing babies from three days to two weeks of age and found them to be almost entirely free of

\*Read at a meeting of the Philadelphia Obstetrical Society, May 6, 1926.

either streptococcus or staphylococcus, an organism which we found on thirty out of fifty cultured breasts. Next, to find if there was any antibody or bacteriophage in the babies' saliva, we collected in a sterile pipette one c.c. of saliva from the mouths of nursing children, and in this implanted pathogenic organisms collected from the breasts of nursing mothers. The organisms multiplied rapidly, showing that the saliva of a nursing child is a good medium for the growth of bacteria. Then, to determine the value of the boric acid treatment, we washed the nipples and breasts of twenty mothers with a saturated solution of boric acid and cultured them, using sterile broth as a medium. After thirty-six hours' growth we found practically no difference in the number of bacteria per field in the cases washed with boric acid solution and the cases cultured from the unwashed breasts. We next took ten c.c. of glucose bouillon and ten c.c. of boric acid solution, mixed them, and in the mixture placed the culture from an unwashed breast, with the result that, after thirty-six hours, there was a marked growth of bacteria. These procedures proved to our satisfaction that a breast washed with boric acid solution was not safeguarded to any decided degree.

Hypochlorite seems to hold out a just claim as an antiseptic safe for both mother and child. Experimenting in fifty cases with solutions of varying strengths, we have proved that a solution as low as one-tenth of one per cent will, if it is sopped on the breast with a square of sterile gauze for one minute, or, if the gauze be allowed to remain on the nipple for one minute, kill all surface bacteria. A culture of the breast thus treated showed no growth after thirty-six hours. Bacteria would not grow in a two c.c. mixture of hypochlorite and broth (hypochlorite one-tenth of one per cent). Therefore, we at once discontinued the use of boric acid solution and substituted hypochlorite solution one-tenth of one per cent. The result has been that in six months of continuous use we have had no cases of breast abscess develop while the patient was in the hospital; and we have seen no trace of irritation to either the skin of the breast or to the baby's mouth. We believe that by a conscientious use of hypochlorite solution as a skin antiseptic in nursing mothers the infection resulting from surface bacteria can be eradicated. It is hoped that a further trial will bear out the results thus far obtained. Of course, it is understood that as soon as a fissure occurs in a nipple, nursing is at once discontinued and the breast pumped until the fissure heals. To allow the mouth of the child to come into contact with a fissured breast is to invite an abscess.

We were greatly aided in our investigation by the care and laboratory technique of J. Atlee Dean who not only gave us his assistance but placed his laboratories and staff at our disposal.

(For discussion see page 264.)

## NONSPECIFIC PROTEIN THERAPY IN GYNECOLOGY\*

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THIS method of therapy was at first based principally upon empiric grounds, as there existed neither specific nor scientific basis for its use. The criterion of the efficacy of a drug depends upon the results obtained; and the results of the nonspecific protein therapy in gynecologic infections have been so gratifying that its use became quite widespread, especially in Germany and later in the United States. The increased application of this principle of therapy also led to careful study of the subject and we have at present at our disposal a considerable number of statistical and experimental reports pertaining to this problem.

### PREPARATIONS USED

1. Proteins; i.e., purified casein, caseosan, aolan, fat-free milk extracts.
2. Mixtures containing proteins; i.e., milk, lactogen, blood serum.
3. Products of protein splitting; i.e., purified proteoses, commercial peptones.
4. Bacterial vaccines when used in nonspecific infections.
5. Terpietin, a preparation of turpentine and olive oil. This produces a cold abscess, and the patient then absorbs the disintegrated products and derives the benefits of nonspecific protein therapy.

After bacterial vaccines for specific infections came into use, it was observed that any substance which was capable of inducing a "shock-reaction" in the patients would cause some beneficial therapeutic effect. Hence, there was really only a step from specific to nonspecific protein therapy.

Nonspecific protein therapy was first used in gynecology in the form of milk. In 1916 Schmidt and Saxl introduced intramuscular injections of milk in order to bring about a protein reaction; i.e., the febrile reaction with its concomitant phenomena.

Gellhorn was the first in this country to call attention to the value of milk injections in gynecologic infections. He said, "Protein substance introduced by subcutaneous, intramuscular or intravenous injections have the faculty of stimulating the cells to greater activity and of activating the protoplasm. All cells of the body feel this rejuvenating influence but none more so than those cells which have been weakened or paralyzed by infection."

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# THEORIES

There are various theories as to the mechanism whereby a good effect is brought about by nonspecific protein therapy. Weishgardt maintains that the therapeutic effect is a plasma activation, namely, that with the injection the organism is stimulated, and that the resulting reaction represents a summation of all the forces of resistance with which the body is equipped. The leucocytes become more active, their number is increased by stimulation of production in the bone marrow; antibodies, therefore, fixed to the cell are shed, enzymes are mobilized, and glands of internal secretion stimulated. In addition to this active phase, there is also developed a passive form of resistance, namely, the increased tolerance to intoxication. This stimulates the phenomena observed after anaphylactic shock. Von den Velden, Luithlen and Starkenstein have all observed the decided changes that occur in the permeability of the capillaries after nonspecific injections. The conclusion may be reached, says Peterson, that the various nonspecific agents injected are marked by permeability in the cell membranes. This implies that there is an increase in the lymph flow, the irritability of the nerve cell is increased, and there is a freer exchange between blood plasma and cell content. Sensitized cells give up their antibodies, enzymes are mobilized, thrombokinase and fibrinogen increased, and the blood-sugar level altered.

The period of increased cellular permeability corresponds with the clinical period of increased general malaise and the local aggravation of the inflammatory process. This phase is followed by one of diminished permeability. It is in this stage that we find the cellular resistance to intoxication increased, the threshold for nerve stimuli raised, and evidences of intoxication and inflammation subsiding, while the patient experiences a general improvement.

Clinically, what do we observe following the injection of a nonspecific protein substance?

Most writers on this subject claim that a shock reaction with a high temperature is essential in order to obtain a beneficial result. I have obtained equally as good results without any febrile reaction, by using sterile milk in the form of aolan lactogen or milk of a low bacterial count as certified milk. By doing so you save the patient from a great deal of discomfort and make it possible to treat the subacute cases in your office. The temperature soon reaches and stays normal.

Leucorrhea is increased at first and soon begins to lose its purulent character and lessens in quantity. Many of my cases, whose smears were positive for gonococci, became negative. On vaginal examination, one finds the pelvic organs that were matted together, very tender, and could not be outlined, now less tender the exudate being absorbed, the uterus palpable, adnexa smaller, or entirely normal.



The blood changes that follow injections of nonspecific proteins, have always been described as a leucocytosis with an increase of the polymorphonuclear leucocytes. My observation differs. I have found a leucopenia with a decrease in the polymorphonuclear leucocyte but an increase in the lymphocytes, chiefly the small lymphocytes. Whether this is due to the fact that I used sterile milk and did not produce a febrile reaction in the cases in which I had blood studies made I am not prepared to say.

The local reaction may consist of a painful induration at the site of the injection and an increase of the pelvic or abdominal discomfort. Usually, however, marked and immediate relief from pain follows within twenty-four hours after the first injection. The patient develops a sense of euphoria or well-being which is quite remarkable, and the sedatives can often then be dispensed with.

R. M. Rawls says that the great relief of pain in adnexal inflammation was so constant that his associate suggested its use as a differential sign in suspected ectopic gestation.

To summarize the effect of nonspecific protein therapy; there is an immediate negative phase with increased permeability of capillaries followed by a positive phase with decreased capillary permeability. The increased permeability causes an increased flow of lymph,—especially of the liver and skin which washes into the blood stream a large variety of products of cell metabolism.

Brown and Greenthal observed further blood changes. In the later stage, there is an increased number of young and atypical red blood cells and an increase in the number of blood platelets. The fibrinogen, thrombokinase and globulin are increased. There is a slight rise in the blood-sugar curve at the height of the reaction following the protein injection. There is a moderate rise in the urea and total non-protein nitrogen of the blood. The proteolytic ferments of the blood are increased. The antibodies of the blood are increased. Some of these findings come from the Johns Hopkins University.

Is there any danger in the use of nonspecific protein therapy?

R. M. Rawls says, "Even with intramuscular injections of milk it is well to keep in mind the contraindications to the injection of the more active substances. Care must be observed to obtain a history of hypersensitiveness on the part of the patient,—serum sickness, asthma, urticaria, angioneurotic edema, epilepsy, alcoholism, pregnancy, various cardiac lesions, and diabetes, in which conditions the use of non-specific protein therapy is contraindicated."

My experience with the use of bacteria-free milk not producing a shock reaction makes for no contraindication and its use is free from danger in all cases.

Sensitization to repeated intramuscular injections of milk seems to be rare, although it is being used quite frequently. Hecht made intracutaneous injections of milk in patients injected previously with milk and also in noninjected patients. There was no difference in the skin response, nor was he able to demonstrate milk antibodies.

Experience has shown that when the dosage of the foreign protein is carefully determined it is practically free from danger. At the Cook County Hospital there were given over 2,000 intravenous injections of the typhoid vaccine in the treatment of various acute infections without any serious consequences.

I have treated 32 cases of pelvic inflammation with nonspecific proteins; 24 acute and subacute, and eight chronic cases. I failed to obtain any beneficial result in the chronic cases and am convinced that this form of treatment is useless in cases of long standing where dense adhesions have formed. Of the 24 cases, 18 were due to gonococcal infection. This was demonstrated either by positive smears, history of acute gonorrhea in the husband or by the character of the infection.

The remaining six were postabortal and puerperal, which are mostly due to staphylococci and streptococci. The quickest and best results were obtained in those due to the gonococci. In the first six cases, I used plain milk boiled for three minutes, and obtained a violent reaction in six to eight hours, severe chills followed by high fever and finally profuse sweats. The reactions were so severe that patients feared taking the injections and I admit myself being rather nervous about giving them on account of the severe reactions and discontinued giving them for a while.

While abroad in 1922 and 1923, I observed the use of sterile milk in pelvic inflammation and found they obtained excellent results without causing a shock reaction. Since my return I have treated acute and subacute pelvic inflammation by this method with good results and no hazard to the patient.

My method of treatment consists of an intramuscular injection every other day of 10 c.c. of certified milk skimmed and boiled for five minutes on a water-bath, or the same quantity of aolan. Copious hot vaginal douches twice daily also help in the absorption of the exudate. Nonirritating food and hemotonics are essential to overcome any hemolysis so often seen in these infections. The number of injections varies from five to fifteen or an average of about nine.

#### CONCLUSIONS

Nonspecific proteins have a definite and valuable place as therapeutic agents in the treatment of gynecologic infections. Their judicious use will replace surgical intervention in some cases and will

thereby not deprive women of the sex organs, and enable them to continue menstrual and reproductive functions.

Following the use of nonspecific proteins there develops a leucopenia, with a decrease in the polymorphonuclear leucocytes and a relative lymphocytosis. This, therefore, supports the theory that the beneficial effect derived from this method of treatment is an increased lymphogenesis and lymph flow to the region of infection.

A febrile reaction with its train of disagreeable symptoms is not considered essential in the successful use of nonspecific protein therapy as was heretofore thought necessary. A fat-free milk of low bacterial count will give good results without a reaction and with very little discomfort to the patient.

In my experience, the use of this therapeutic agent yields the best results in the acute and subacute pelvic infections; i.e., before dense adhesions have had time to develop.

The immediate effect of the injection of nonspecific proteins is the disappearance of pain and the development of a sense of well-being.

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# HYDRAMNIOS IN UNIOVULAR TWINS; WITH THE REPORT OF A CASE\*

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**H**YDRAMNIOS, or polyhydramnios, an excess amount of amniotic fluid in pregnancy is rather an infrequent complication in an acute form. Randall, in reporting from the Mayo clinic, states that it occurs in the chronic form approximately once in 150 pregnancies. Chambrelent, writing in 1914, asserted that acute hydramnios was relatively rare and that he could find only 50 cases recorded in the French literature. Burstal, writing in 1910, recorded 13,967 pregnancies with 133 instances of hydramnios; no mention was made of the acute form.

When the quantity exceeds five pints (1½ liters) it is sufficient to upset the normal relation in size of the uterine cavity to the fetus. Very large quantities of fluid have been reported.

The origin of the amniotic fluid is conjectural. It is generally conceded to be fetal and its over-production may also be fetal, since it usually occurs in healthy women.

In hydramnios, certain fetal maladies are very common, as hydrocephalus, anencephaly, spina bifida, harelip, and talipes. It frequently occurs in uniovular (homologous) twin pregnancy, affecting only one amniotic sac. When associated with uniovular twins, there is no doubt that the fetal urine has to do with the overproduction of fluid. The twins, as a rule, differ markedly in size. The heart and kidneys of the larger twin are greatly hypertrophied; the hydramnios affects the amniotic sac of the larger twin, that of the smaller twin containing a normal or a diminished quantity of fluid. The umbilical vessels of uniovular twins always anastomose freely in the single placenta, and if, for some reason, one twin obtains more than its fair share of the circulating blood, its heart and kidneys hypertrophy, with the result that the secretion of urine is greatly increased and hydramnios follows.

The characteristics of the fluid in hydramnios do not vary from the normal. Hydramnios is more common in multiparae, but this may be only relative, not actual. Syphilis seems to play only a coincidental part in hydramnios. Floris, in his collection of 224 cases, reports the occurrence of five syphilitic infants; three of these children lived.

The chronic form is very much more common. This may, and prob-

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ably does, begin early in gestation, going unnoticed for a time, not becoming recognized clinically until the fourth or fifth month of pregnancy. Planchu believes there are two forms of acute hydramnios, one which appears during the early months of gestation, and one which develops in the later months of normal gestation, or supervenes on hitherto chronic hydramnios. He (Planchu) thinks the very early cases are twin pregnancies and that the early cases abort.

In two per cent of the cases of hydramnios, it assumes the acute form, there is rapid abdominal enlargement, and in severe cases it may be seen to enlarge daily. It is in this type that symptoms are most marked.

When the increase of fluid is gradual, the heart and lungs are more apt to adapt themselves to the increased abdominal pressure. Although the abdominal enlargement is often enormous in this condition, the patient suffers relatively little discomfort. The only distressing conditions are some embarrassment of respiration and heart action, which are most marked in the recumbent position, the patient resting best propped up in bed. There may be slight pain and anesthesia of the lower extremities. Edema of the legs may or may not be present. There is no special tendency to albuminuria.

The abdominal enlargement is general, the transverse diameter is increased and the whole abdomen suggests the presence of a spherical tumor, rather than the normal ovoid uterus. The subcostal angle is widened and all available abdominal space seems to be filled by the encysted fluid mass. There is a fluid thrill felt over all parts of the abdominal surface. The lower uterine segment is wide and resistant. The whole uterus imparts an evenly resistant sensation to the palpating hands.

As a rule, no fetal parts can be felt. If one is fortunate enough, however, to touch a fetal structure, it is by deep palpation only and the sensation is that of a floating body in a large quantity of fluid.

Fetal movements and fetal heart sounds are rarely elicited. Because of the great distention of the lower uterine segment, the cervix is elevated. Increased intrauterine pressure and stretching of the lower uterine segment causes a varying degree of cervical obliteration and dilatation. By vaginal examination, with the patient's shoulders well elevated, floating fetal parts may be detected through the thin lower uterine segment or through the dilated cervix.

Pregnancy, with ovarian cyst, with ascites, with overdistention of the bladder, or with twins, has occasionally been mistaken for hydramnios. If a careful history is taken, and a careful investigation made, a differential diagnosis should not be difficult. It must be remembered that the roentgenologist may be able to demonstrate even a very young fetus in a great quantity of fluid.

Farranridge, of Sydney, Australia, reports a case of acute hydramnios—previously diagnosed as acute appendicitis complicating pregnancy. A woman of twenty-five, para ii, and about six months pregnant, was awakened at night with severe generalized abdominal pain, immediately followed by vomiting, subnormal temperature and pulse of 140. Although the history revealed that she was six months pregnant, the abdomen was greatly distended and larger than at full term. It had doubled in size during the preceding twelve hours. The rigid abdominal wall greatly masked the condition lying beneath. Rigidity and tenderness were most marked in the right lumbar and iliac regions. The fetus could not be felt by abdominal palpation and fetal heart sounds could not be heard. There were no uterine contractions; however, the cervix was completely dilated, the membranes were bulging, and a small fetal head could be ballotted. He (Farranridge) made a diagnosis of acute hydramnios and punctured the membranes, freeing a large amount of fluid and a small child. Then to his surprise, there was another amniotic sac, overfilled with fluid and containing another child. Well-formed, living twin boys, one  $2\frac{1}{2}$  and the other  $2\frac{3}{4}$  pounds, with one placenta, were extracted. All symptoms immediately disappeared after the contents of the uterus were evacuated.

If there is spontaneous rupture of the membranes, or if the fluid is permitted to escape rapidly, the cord may be swept out with the gush of fluid. Because of the overdistention of the uterus and inability of the lower uterine segment to grip the presenting part, abnormal presentation must be anticipated. The overstretched uterus contracts poorly and at times it is necessary to deliver the placenta manually and to prevent postpartum hemorrhage by uterine packing.

Through the courtesy of Doctor P. Brooke Bland, I am privileged to report the following case:

Mrs. A. S., aged twenty-five. No history of plural pregnancy in the family. Had no severe illnesses, operations, or injuries during her entire life. Menstruation normal.

The patient was married at the age of nineteen, and the first child was born when she was twenty-one. Of four pregnancies, three terminated spontaneously at full term, with normal living children. All recoveries were normal. The last normal period occurred on Aug. 1, 1925. The patient had been entirely free from nausea and vomiting, and had no unusual symptoms at all, excepting amenorrhea and slight breast changes during the first three months. Fetal movements were first felt about Dec. 10. Up to this time the abdominal enlargement was scarcely noticeable.

From the second to the fourth week in December, the abdomen enlarged from a slight prominence below the navel to a distention greater than had ever been present in her previous pregnancies even at full term. As time advanced, the distention seemed to grow more rapidly, and on Dec. 24 the entire abdomen became tender and painful, the pain being most marked in the flanks, and much greater in the right flank than in the left. There was no vomiting.

Previous frequent micturition, which had been present both by day and by night, had entirely disappeared, and dyspnea had progressively increased to the extent that it was almost impossible to lie flat. There was no edema of the lower extremities, in fact there seemed to be no circulatory disturbance of any kind. Fetal movement was felt early in December, but after the abdominal distention became severe, this sensation completely disappeared.

This patient consulted a neighborhood doctor late in December and was told she would soon start in labor.

On Jan. 3, the generalized abdominal pain, which had previously been constant, became intermittent in character, and an out-patient student of the Jefferson Medical College was called in to deliver her. What seemed to be labor did not progress. The size of the abdomen, however, was noted to grow daily. On Jan. 5 a consultation was called, and I found a young woman, small in stature, propped high in bed in great discomfort. The face showed signs of suffering from loss of sleep. The teeth and gums were in very poor condition. All of the signs of well advanced pregnancy were present in the breasts. Respiration was rapid; the lungs were negative; the abdomen showed a massive ovoid enlargement; the abdominal wall was tense and the skin glistening, and the abdominal veins were distended. A fluid wave could be easily felt over all parts of the abdomen. The entire abdomen was slightly tender, and the outline of the uterus could not be felt. Fetal parts were not palpated and the fetal heart sounds were not heard.

Vaginal examination showed a cervix situated high in the pelvis, dilated about 3 cm. with a small fetal head presenting. The membranes were intact, but not very tense, and there seemed to be very little fluid present, in fact the fluid was so scant that ballottement could not be elicited. The patient was immediately admitted to the hospital.

An ovarian cyst, complicating pregnancy, which had for some reason taken on very rapid growth, was thought of and was later disproved by an x-ray examination.

The pelvic measurements were well within normal limits. The urine was amber, normal except for a faint trace of albumin and a moderate amount of indican. Blood examination showed the hemoglobin 66 per cent; 4,200,000 erythrocytes; 5,400 leucocytes, and a color index of 0.78.

The blood pressure was 120/80.

X-ray report submitted by Doctor W. F. Manges was as follows: "We can only see the skeletal outline of one fetus on the right side. It is fairly high. The uterus seems to be distended considerably. On the anteroposterior view the density is so great as to obliterate the outline of the fetus. We would naturally suspect polyhydramnios as the cause."

During the short stay of this patient in the hospital, before operative interference was instituted, there was a daily noticeable enlargement of the abdomen.

On Jan. 9, Doctor Bland operated upon the patient under ether. The cervix was found to be almost completely dilated. The membranes were intact and bulging, and a small fetal head was presenting. The membranes were ruptured and a small amount of amniotic fluid was expelled. A small, well-formed, and living female child was extracted. A large, tense sac presented. This was carefully punctured, allowed to drain slowly, and 8500 c.c. of amniotic fluid were collected. A second, well-formed, living female child was extracted. A single placenta was then removed manually and the uterine cavity was packed with plain gauze. An ampule of ergot and of pituitrin were then given hypodermically, a tight abdominal binder applied, and the patient returned to the ward in very good condition. After the uterus was emptied, it contracted firmly and there was very little bleeding. The patient recovered without any complications.

I recently examined this woman and found her in excellent health. The uterus was normal in size and in good position. Involution of all abdominal and pelvic structures was complete.

#### COMMENT

Floris collected 224 cases of hydrannios which occurred in Vienna between 1910 and 1921; there were 32 pairs of twins, no triplets, 49 stillborn infants, 24 who died soon after delivery, 182 born alive, 95 premature infants and 30 moustrosities.

Randall reports a case of homologous triplets with polyhydramnios in a woman of twenty-three, para ii. This patient, it is stated, had a negative Wassermann.

Wetterwald, in disussing the literature on the complications of pregnancy with ovarian cyst, states that in the majority of the cases hydramnios was mistaken for the true condition.

Floris, writing in 1923, traced to that date, 65 of 236 children born with hydramnios. Only 14 per cent are known to have died. The physical and mental development of the others has been excellent, averaging well with other children.

While Krahula, writing about the same time, reports on 72 cases collected at Bonn and 219 cases collected from the literature, in this series only 3.78 per cent of the children survived and only 1.03 per cent of the total number were normal.

Krahula, writing at an earlier date, in his reports from the Bonn clinic and cases collected between 1877 and 1910, found that 103 of 291 infants were born dead; only 11 (3.78 per cent) lived, and only 3 (1.3 per cent) were healthy. The maternal mortality was not mentioned.

It is found there is a wide diversity of opinion regarding this feature of the condition.

Henry, of Paris, reports a case in 1925, in which the cord was coiled eight times, with complicating hydramnios. He states that the child was delivered normally and alive.

Balard records a case of hydramnios which seems to have occurred after the death of the fetus.

During the past twelve months there have been 997 deliveries in the Jefferson Maternity Hospital, including the patients delivered on the outside, but supervised by the dispensary staff. In this number, there have been two cases of hydramnios, or one in 498.5 cases. The children were all well formed, but premature. The mothers had a negative blood Wassermann. In one case the babies were living, but not viable; in the other, the baby was slightly macerated.

In a review of the literature as far back as 1900, very little is said of the treatment for this condition. It would seem that something might be done to carry these women along by draining off the amniotic fluid gradually by uterine tapping (as recently suggested by a continental observer) until the child reaches such an age that it might live independently of the mother.

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## PERITONEAL ACTINOMYCOSIS, WITH THE REPORT OF A CASE\*

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**A**CTINOMYCOSIS is a chronic inflammatory condition produced by the invasion of the human tissues with the actinomyces or ray fungus. The gastrointestinal tract becomes the host of this parasite through contamination with vegetable matter, such as grass, straw or grain, and may there either produce an infection or the organism penetrates the gut wall through an abrasion to infect adjacent abdominal structures. In the transmission of this infection the lymphatics play little or no part, as extension takes place by continuity. Metastasis to distant organs occurs through the medium of the blood stream. Infection of the tissues by the ray fungus results in an inflammatory mass that is characterized by slow growth and the production of new connective tissue. During the course of the disease, areas of necrosis occur throughout the mass, forming multiple abscesses of various sizes that may rupture into hollow viscera or upon the surface of the skin, causing fistulas or sinuses. The contents of the abscesses consist of necrotic material that shows the presence of numerous small yellow seed-like particles popularly named "sulphur granules"; the recognition of these bodies immediately suggests the true nature of the infection. These granules can often be seen in pus from discharging sinuses which, upon staining, show the organism.

Doubt and confusion have frequently arisen regarding the source of the actinomycotic infection, Wolff and Israel being the proponents of the older theory and Bostroem expounding a newer one. To aid in clarifying the situation concerning the types of organisms that may infect man and cattle, Sanford of the Mayo Clinic says, "It is best to follow the recommendations of the Committee on Nomenclature, and to classify as belonging to the genus actinomyces, those organisms growing with much branching mycelia which may break up into segments that function as conidia, sometimes parasitic, with clubbed ends and radiating threads in the lesions of the animal body. The organism is nonmotile and certain species are anaerobic. It must also be said that some of the actinomyces are acid-fast while others are not. When an organism that can be so classified in this genus is found in the tissue or discharges, the disease must be called actinomycosis."

The same author in an exhaustive search of the literature in the United States has collected 678 cases of human actinomycosis. He

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states that the infection has attacked every part of the body except the esophagus and lachrymal duct. The more frequent sites are the head and neck, the abdomen and thorax, named in order of their frequency.

Clinically, abdominal actinomycesis is readily mistaken for other slow growing tumefactions. This mistake is frequently made even when the mass is palpated and inspected through an abdominal incision, unless, through a rupture of an abscess cavity the characteristic "sulphur granules" are noticed. The inflammatory mass is usually diagnosed as neoplastic in origin. The abdominal or peritoneal form of the disease is caused by the penetration of the ray fungus through the intestinal wall. The peritoneum immediately reacts by the formation of adhesions that later become very dense, matting together the intestinal coils to adjacent structures. The organism, in spite of dense lesions acting as barriers, continues to burrow and to produce by continuity further inflammatory tissue. Necrotic areas may occur early in the disease but may not give evidence of their formation until late.

This type of actinomycesis has a mortality rate of 70 per cent. Operative death frequently depends upon injuries to important structures in attempting the removal of the growth. Owing to the dense adhesions encountered, and the burrowing tendencies of the mycelia, gut wall is easily perforated, blood vessels injured, and death occurs from shock, hemorrhage and peritonitis. Remote deaths are due to cachexia, caused by recurrences and extension to the liver and thorax, following incomplete excision of the primary mass. This is well illustrated in Hellwig's collected series of 30 operated cases of adnexal actinomycesis, 21 of whom died at intervals varying from three months to six years following the primary operation.

The following is a case report occurring in the Gynecological Division at the Harlem Hospital:

Patient V., colored, unmarried, was admitted to the hospital May 3, 1925, complaining for the past two months of abdominal pain and leucorrheal discharge. Her previous history had no bearing upon the abdominal condition. The menstrual history was normal. Upon examination she presented a tender tumor mass situated in the suprapubic region that was fixed to the abdominal wall and pelvic viscera. The size was estimated to be 10x12 cm. As there was a moderate degree of endocervicitis, a diagnosis of tuboovarian disease of probable gonorrheal origin was made. There was no fever. The leucocyte count and urine were normal. Cervical smears showed a moderate number of pus cells, but no gonococci.

The patient was placed upon diathermy treatments for a week without improvement, when an operative procedure was decided upon.

*Operation.*—When the abdominal wall was incised through the rectus muscle, it was seen that the mass involved the parietal peritoneum immediately under the incision. It was clearly circumscribed, extremely dense in consistency and seemed to be connected with the dome of the bladder. The estimated measurements were 12 cm.

long, 10 cm. wide and 3 cm. in thickness. The peritoncum was incised at the upper angle of the wound to one side of the mass, and the abdominal cavity entered. Many dense adhesions were encountered. Upon their separation it was seen that a loop of the sigmoid was firmly fixed to the tumor mass. This was freed with difficulty by sharp dissection and, in order to prevent injury to the gut wall, it was necessary to leave a portion of the tumor mass attached to it. Further inspection of the abdominopelvic cavity revealed other adhesions to the pelvic viscera, but the uterus and adnexa were not involved in the inflammatory process. The mass now was seen to be an invasion of the parietal peritoneum, and the transversalis fascia apparently attached to and involving the dome of the bladder. It seemed to be neoplastic, rather than inflammatory in origin. No yellow areas were seen suggestive of abscess cavities. Partial excision of this mass was done more for diagnostic than therapeutic purposes. This procedure was considered more conservative than to attempt a complete excision with resection of the bladder, especially as the diagnosis

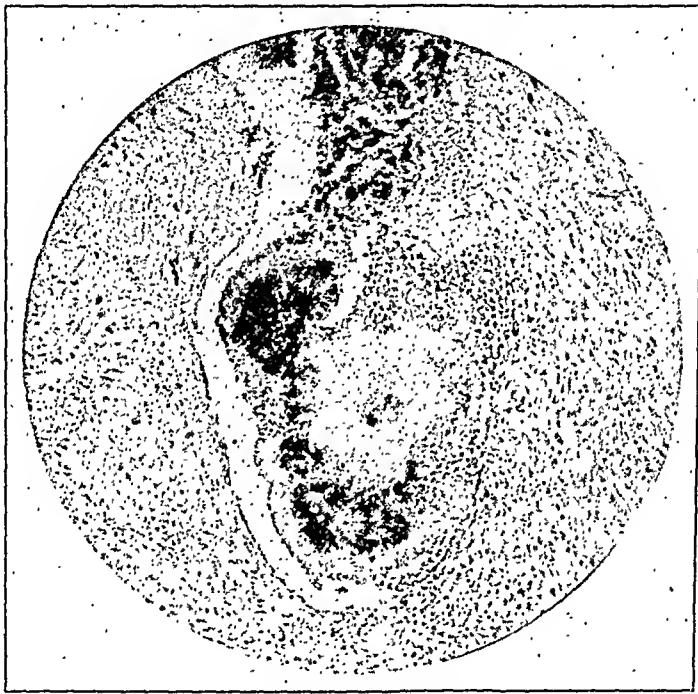


Fig. 1.—Showing the ray fungus with the mycelia imbedded in a zone of tissue consisting of fibroblasts, connective tissue cells, and round-celled infiltration.

was doubtful. The abraded surfaces of the gut were peritonealized and the abdominal wound closed without drainage.

Pathologic findings were as follows: The gross specimen, on section, was composed of fibrous tissue and fat. Microscopically the sections showed granulation tissue composed of fibroblasts in which small abscesses were found that contained numerous eosinophil leucocytes, polynuclear leucocytes, occasional plasma cells, and only a few large cells with foamy cytoplasm. In this granulation tissue there were bacterial colonies which, in gram stain, were composed of threads that stain gram-positive. Diagnosis: Actinomyces.

The postoperative course was uneventful except that on the fifth day there began a gradual extension to all the pelvic structures of what remained of the original growth. Masses appeared under the abdominal incision larger than before operation, and the pelvic cavity became completely filled with what seemed to be a hard exudate. No excessive rise of temperature occurred. On the tenth day the superficial

abdominal wound broke down in two places and discharged pus for a while, but gradually healed. The patient was placed upon increasing doses of potassium iodide, according to improved therapeutic measures, and the abdominopelvic masses grew smaller and finally completely disappeared. Cystoscopic examination revealed a normal bladder. The patient was discharged from the hospital on June 27, 1925, in an improved condition and apparently free from the disease.

Follow-up examination on July 25, 1925, showed an abdominal wound entirely healed; no sinuses were present and no abdominal or pelvic masses felt. The uterus and adnexa were normal.

Communication by letter from the patient in October, 1925, reported the condition satisfactory.

Communication April 15, 1926, from the mother of the patient stated that the abdominal wound intermittently broke down and discharged pus, then healed for a period of time.

The patient has been advised by letter to take potassium iodide in large doses, and to have roentgen ray treatment as recommended by Bragden.

Further surgical procedures of a more radical nature have been advised if the conservative treatment recommended does not result in the elimination of the disease.

*Comment.*—This case is reported: (1) On account of the unusual site of the lesion in the abdominal wall, simulating an intraabdominal condition. (2) Inoculation of the suprapubic area no doubt originated from the adherent loop of gut without itself showing any gross lesion. (3) The surprising feature that partial removal of the infected focus would produce complete disappearance of the gross pathology.

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580 PARK AVENUE.

# THE RELIABILITY OF THE WASSERMANN REACTION IN PREGNANCY

## A REPORT ON FIVE HUNDRED CASES

BY J. R. McCORD, M.D., ATLANTA, GA.

*(From the Department of Obstetrics, Emory University School of Medicine)*

IN AN attempt to determine just how variable the Wassermann reaction is during pregnancy, the test was repeated on 500 pregnant negro women.

The laboratory work was done by the pathologic department of Emory University; the sheep-cell system was used. Only two persons made the tests, one of whom made over 90 per cent of them.

The first test was made at the time of the initial visit to the prenatal clinic. The duration of pregnancy at the time this was done was variable. The blood for the second test was taken at the time the patient was admitted to the hospital; in most of the cases, during the first stage of labor. For obvious reasons some of these second tests were made during the puerperium.

The reactions on the 500 women agreed in 87 per cent of the cases. There were thirty-nine cases in which the clinic Wassermanns were positive and the labor Wassermanns were negative. Of these, thirty-one cases had had antisyphilitic treatment. If we are allowed to deduct these cases, our reactions agreed in 93 per cent.

The clinic reaction was negative and the labor one positive twenty-six times. The Wassermann remained positive in thirty-five cases that had treatment. In sixteen, the treatment was slight, in nine fair and in ten good.

There were only sixteen cases in which both the maternal and cord Wassermanns were positive.

In eleven cases, the reactions had agreed but the mothers were discharged undelivered. Upon readmittance, the reactions again agreed in ten of the eleven cases.

## CASE REPORT

### REPORT OF BILATERAL DERMOID CYSTS OF THE OVARIES IN A YOUNG GIRL

By J. P. McDowell, M.D., St. Cloud, Minn.

Patient, white, age fifteen, American born, student, single, first seen by family physician Feb. 18, 1926. General condition: well nourished, strong, muscular, heavy boned type, bordering on the masculine. Previous illness, pertussis, varicella, rubella, tonsillitis and influenza, the latter in 1919. Had tonsillectomy in 1924. Menstruation began at fourteen, 28 day period, lasting three or four days, with no pain and a light flow. Parents and brothers and sisters living and well. Denied all venereal exposures or pregnancy.

Began present complaint Feb. 18, 1926, with pain in lower right quadrant, no nausea or vomiting. Pain lasted till Feb. 20. Felt well for two days except for loss of appetite. On Feb. 22 ate some toast and a few hours later the pain returned and continued, gradually becoming worse, accompanied by nausea and vomiting. Bowels had been regular till Feb. 23.

On Feb. 24 was taken to hospital where I first saw her.

*Examination.*—Abdomen, contour normal, except for an elevation projecting from McBurney's point into lower right angle, right rectus rigid. Palpation elicits pain in lower right quadrant, with extreme tenderness over McBurney's point. Pelvic examination neither made by rectum nor vagina. Leucocytes 7,800, temp. 97.6°, pulse 70.

*Operation.*—Right rectus incision made and the appendix found to be adherent at the distal end which dipped into the pelvis. There were many adhesions of the small bowels to the pelvic organs which hid them from view. The appendix was loosened, amputated and the stump invaginated into the cecum.

On examining the pelvis a hard tumor  $3\frac{1}{2}$  inches in diameter was found behind the right fallopian tube, and a similar tumor  $2\frac{1}{2}$  inches in diameter was found behind the left tube, and both proved to be ovarian. An attempt was made to shell them out and leave some of the ovarian tissue, but this was impossible, and the whole mass had to be removed in each case.

On opening the appendix it was found that the outside was gangrenous, but the mucosa appeared quite normal macroscopically, indicating that the infection had attacked from without. The tumors contained hair, skin, fat, teeth, and a quantity of greasy substance.

The tubes were red and swollen, but were left in situ. Patient made an uneventful recovery. Now four months after operation she has shown no indications of menstruating, nor untoward symptoms from loss of ovarian secretion.

Cases of bilateral dermoid cysts of the ovary in young girls are rare and I have been able to find only two cases younger than this one in the literature.

ST. MARYS BLDG.

# Department of Maternal Welfare

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CONDUCTED BY FRED L. ADAIR, M.D.

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## MATERNITY WORK IN THE COLONY OF HONGKONG

By R. E. TOTTENHAM, M.D., D.P.H., F.R.C.P.I., HONGKONG, CHINA

*(Professor of Obstetrics and Gynecology, Hongkong University,  
Late Assistant Master, Rotunda Hospital)*

WHEN asked to write an article dealing with conditions surrounding maternity and maternal welfare movements here, it was added "if any such exist." Now as I am not quite sure how to answer this latter remark, I will content myself with trying to describe what we are doing, which I am afraid must seem very insignificant compared with American or European standards. But I would ask that it should be remembered that we are dealing with a people, the masses of whom are uneducated and who do not take to new ideas kindly. Not only this but we are competing against those who practice Chinese native medicine and since they cannot profit by the introduction of modern methods, must of necessity be opposed to us. I do not wish to disparage Chinese medicine in any way. I am sure there is very much to be learned from it, and that it would repay a thorough investigation; but at the same time I cannot believe that its universal practice would be attended with as low a mortality rate as that of modern medicine.

With regard to China proper I have no information, but I doubt if there is any maternal welfare work worth considering outside the larger cities, except what the missionary enterprise may be responsible for.

Hospital development in the Colony is greatly hindered by lack of money; building sites are dear, for land is extremely valuable. There are three organizations which interest themselves in midwifery and the training of midwives.

1. The Chinese-controlled maternity hospitals, namely the Tsan Yuk and the Wanhai Hospitals, the maternity departments of the Tung Wah and the Kwong Wah Hospitals, the latter two being general hospitals.

2. The Alice Memorial Hospital, which is under missionary supervision.

3. The Government Civil Hospital.

The Tsan Yuk Hospital is devoted entirely to maternity and gynecologic cases, and the maternity work here, as in the case of the other Chinese-controlled hospitals, is under the supervision of Dr. Hickling, to whom I am indebted for much of my information, and for facilities for working in the hospital.

The building was opened about three years ago; the ground floor contains an out-patient dispensary, a nurses' dining room, and an isolation ward for such cases as typhoid or dysentery, where it is desirable to have the patients at some distance from the maternity wards.

On Friday mornings there is an infant welfare dispensary, and during the last year 341 infants were brought up, paying a total of 2366 visits; all of these infants had been born in the hospital.

On Saturday mornings there is a general women's dispensary. We have so far regarded it as undesirable, if not impossible, to divide our dispensaries up into gynecologic and antenatal; patients will not readily appreciate the difference and, in the present state of education of the coolie classes, practically no antenatal cases come up at all; indeed the average woman is inclined to regard any attention during pregnancy as entirely superfluous and in my department I am very glad if I can persuade a woman to remain in the hospital for four days after her child is born. As a whole the Chinese are not yet believers in so-called "Western Methods" and often only come to the hospital as a last resource.

There are probably not more than three men doing major gynecologic surgery in the public hospitals and yet, considering the large population, there are relatively few operations performed by any of them. If all the patients recommended for operations from the public dispensaries sought admission, my staff would have to be doubled or trebled.

The first floor of this hospital is devoted to midwifery. There are two large wards, some private wards, making a total of 25 beds, and also a nicely fitted-out labor ward. Last year the total confinements reached 608.

The second floor is a replica of the first. It was opened for gynecology in October, 1925, and contains space for 25 beds. The theatre situated over the labor ward only recently has been fitted out. Since October last when Dr. Hickling kindly placed this floor at my disposal we have operated on about 40 patients between us, but it is really only in the last few weeks that the Chinese public is beginning to know of the work done.

The third floor is devoted to the nurses' quarters.

The entire nursing staff is Chinese, including the matron. The hospital is also a training school for midwives. Before the opening of the gynecologic wards, the period of training was two years, during which time the pupil midwife was resident in the hospital and performed ordinary nursing duties under the supervision of the matron and trained nurses. Since the opening of the gynecologic wards the period of training has been extended by one year, so that the pupils will have a year's experience in the nursing of operation cases and theatre routine.

At the end of their three years they will obtain a certificate from the hospital if their conduct has been satisfactory, and will be eligible to sit for the Midwives Board Examination, which in passing confers permission on them to practice in the Colony.

The Chinese make very good nurses and readily take to routine of any kind; they are quiet, and have the curious quality of frequently being able to anticipate one's wants.

There are seven public dispensaries in the Colony, some in connection with Chinese hospitals referred to. On one day a week a gynecologic clinic is held in each by Dr. Hickling, and patients paid about 4,500 visits last year. As she will now send most of the operation cases to the Tsan Yuk, it is evident that the gynecologic wards of this hospital will be very full in the future. I have given a somewhat lengthy description of the hospital, for I believe it will in all probability contribute more to the maternal welfare of the Colony than any other.

The Tung Wah Hospital contains some interesting features, notably the entrance hall, which is very resplendent with gold work pillars. In appearance it is suggestive of a temple with its little altar, which I presume is dedicated to the Joss of Medicine. Another item of interest is the Chinese pharmacy; like ordinary pharmacies it contains numerous drawers for storing drugs, but it is at once



noticeable that none of these drawers are labelled. The attendants however appear to be able to find any medicine they require without difficulty.

Chinese drugs appear to be made mostly from roots and barks, but in addition one is shown objects which we "Western Doctors" would not suspect to possess any medicinal value, namely cockroaches, sea horses, and such like; the latter I am informed is a very expensive medicine.

In addition to the ordinary pestle and mortar, the Chinese have a novel method of grinding up a drug. On the floor there is an oval trough, about two feet in length, about six inches wide at the top, shelving down to about a quarter of an inch at the bottom; the trough also slopes from each end towards the middle. The substance which is to be ground is placed inside, the mechanism is supplied by a small boy, who stands on the axle of a heavy metal wheel, about eight inches in diameter, which he rolls to and fro with his feet, keeping his balance by holding a rope suspended from the ceiling. Pills are large and are contained in a hollow ball of a beeswax-like substance about the size of a ping pong ball, which acts as a preservative.

In an adjoining room are rows of small ranges, each adapted to hold one pot about the size of a teapot, in which the roots or barks are placed for boiling, the infusion or decoction being then given to the patient. The dose is large, probably about a pint, given, I understand, usually in the morning. Outside there are rows of little open boxes, one for each patient being treated; as soon as the infusion is poured off, the spent roots are emptied into a box, where they are left for 24 hours, so that the patient's relatives can come and inspect the kind of medicine given.

I understand there are wards for "Western" treatment only, and wards for Chinese treatment, and admission to either is optional for the patient.

As far as I can make out every type of case appears to be admitted to the Chinese treatment wards, including fractures, but I have no means of judging of the efficacy of such treatment with regard to the latter.

In the maternity wards of the Tung Wah General Hospital, with seventeen beds, 1122 patients were attended in their confinements by the nursing staff, consisting of two trained nurses only.

In the same wards at the Kwong Wah, with eighteen beds, 1218 patients were confined during the year, the nursing staff consisting of one trained nurse and three probationers, or pupil midwives. There are, however, nine probationers undergoing training in the hospital. The period of training at this hospital is three years.

In the Wanchai Hospital with twenty beds, 812 cases were attended during the year, two trained nurses only being in the hospital.

As I already explained, the work of these hospitals is superintended by Dr. Hickling, and all the nursing staffs are Chinese. Dr. Hickling is also responsible for the training of the pupil midwives.

In the Maternity Bungalow of the Government Civil Hospital approximately 500 Chinese cases are attended every year, and perhaps 50 to 100 Europeans. The building is officially the maternity teaching centre of the University, but it is hoped that in the future more accommodation will be available, for the building as it now exists does not provide adequate space for a growing maternity clinic. The Government Hospital undertakes the general education of nurses and on completion of

three years' training the nurse is eligible to take midwifery instruction in addition. As far as I understand the object of the government training in this hospital is not so much to train girls for outside work as for duty in government hospitals.

My department in this hospital runs a general women's dispensary twice weekly. I am also endeavoring to make some provision for the treatment of syphilis in women. Unfortunately venereal disease is extremely common and a large venereal disease centre is a matter of urgent necessity, which I hope will be met in the future.

The Government midwives operating in the New Territory (i.e., the part of the mainland leased to Great Britain) delivered 730 women last year.

The policy in the Colony has been to train as many midwives as possible, since it is felt that they can do much to lower the maternal and infantile mortality; and I hope that it is evident from what I have said that the training of the pupil midwife is thorough and essentially practical. A girl who has lived in a hospital for three years under a system such as exists here must have personally nursed some hundreds of patients.

I am indebted to Dr. Gibson for the following account of the work done in the Alice Memorial Maternity Hospital.

The Hospital was opened in 1904, and although there were only twenty beds, some of those interested were doubtful if the Chinese would come in sufficient numbers to justify this new building.

In 1905 only 55 cases were admitted, while in 1917 the number had risen to 662, which affords a good illustration of how Chinese prejudice may be overcome.

The hospital is the maternity block attached to the Alice Memorial and Affiliated Hospitals; Chinese probationer nurses do three years training in general nursing, before taking out their midwifery course, which lasts a year.

Midwifery is taught in the Chinese language by the woman doctor in charge and the sister, assisted by Chinese doctors. All nurses take the course.

Only six nurses are in maternity training at the same time and each attends at least 75 confinements, often a larger number, and makes a complete record of the cases, measurements, etc. In the earlier years when women were unwilling to come to the hospital the midwives also attended extern cases, but that part of the work has been difficult lately, owing to the shortage of the staff.

After training, all nurses strive for the certificate of the Midwives Board (Hongkong); the examination is both written and oral, and requires a good education in Chinese.

Seventy-seven women have qualified as midwives and their services have proved useful; some are in Government service in Hongkong, others hold responsible positions in hospitals under Chinese management, a few are in the Straits Settlements, but the majority are in private practice in Hongkong.

By the training of Chinese women a large proportion of the confinements in the Colony are attended by properly qualified midwives and thus the work has been of considerable value to the community.

In the training of the midwife the importance of obtaining the help of a doctor in all serious cases is emphasized and, as a result, abnormal cases are seen at an earlier stage than heretofore; this is especially noticeable in such conditions as placenta previa.

As Hongkong is a long way from the United States a little local information may be of interest.

An estimate of the population of the Colony for the middle of the year 1924 was as follows:

Non-Chinese civil population .....	16,000
Chinese population, City of Victoria.....	420,000
Village of Hongkong .....	29,800
Kowloon .....	180,000
New Territories .....	85,000
Population afloat (i.e., sampans) .....	68,750
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Total Chinese population .....	783,550
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Total population .....	799,550
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The number of deaths of children under one year old was 4,735	
Non-Chinese .....	37
Chinese .....	4,698

Of these 1,131 Chinese were under one month old, and seven non-Chinese.

The ratio of infant deaths to total deaths was 30.4 per cent. There were eight registered deaths from puerperal fever in 1924, and nineteen in 1923.

There appear to have been in all thirty-three deaths from causes directly attributable to pregnancy.

# Society Transactions

## OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF APRIL 1, 1926

THE PRESIDENT, DR. NORMAN L. KNIPE, IN THE CHAIR

DR. ALBERT B. DAVIS presented a case of **Fetal Death with Retention of Fetus in Utero and Necrosis of Uterus.**

Patient, L. C., colored, thirty-eight years old, first seen March 12, 1925, at the Cooper Hospital of Camden, N. J., for exaggerated nausea and vomiting of pregnancy. She was then apparently 3 months pregnant. Stated last period November 30, 1924. Had typhoid fever at eight years of age; operated (posterior colpotomy?) for pelvic abscess several years ago; no other adult sickness. One child living and well; no miscarriages or stillbirths. Menses normal.

Appearance on admission, thin, weak, acutely ill, having green emesis, temp. 99°; pulse 120. Eyes: Rather prominent areus senilis but pupils reacted normally to light and accommodation. Tongue dry and glazed. Chest expansion negative. Moderate abdominal tenderness at level of umbilicus and over both lower quadrants. Uterus enlarged 3 months pregnancy; pelvis seemed otherwise negative. Blood count: 3,750,000 red; 10,300 white; hemoglobin 75 per cent; neutrophiles 72; lymphocytes 16; large mono. 2. Wassermann negative except +1 in cholesterolin antigen.

She was given proctocylsis of glucose and soda bicarbonate and hypos of corpus luteum 1 c.c. daily for about 10 doses. By the sixteenth there was marked improvement generally; emesis nearly ceased; abdomen much less tender. On the twenty-fourth she had nausea, but no emesis, and severe abdominal pain during the evening. This was much better the next day and there was no more emesis. On the twenty-seventh, condition was so improved that she was out of bed.

A radiograph of chest showed above the left clavicle several small spots of opacity suggestive of very early infiltration.

She was discharged on the twenty-ninth, temperature normal; pulse 90; very much improved and taking nourishment.

She was next seen in the prenatal clinic October 27, 1925, where she came stating she had not felt fetal movements since July. It was evident, after examination, and in light of previous hospital admission, that she was overdue; that there was no sign of fetal life and that the uterus was decreasing rather than increasing in size. Examination seemed to indicate absence of liquor amnii, uterus contracted about the fetus, with fetal bones in one or two areas, especially right upper quadrant, apparently close under abdominal wall, as though about to ulcerate through uterine wall. Patient seemed to be in perfectly good general health, stating, to use her own words, "she never felt better in her life." She had had no bleeding, no pain, or other indication of attempt of uterus to empty itself.

Because of length of time overdue, of evident absorption of liquor amnii, and fear of the condition of uterine walls, no vaginal examination was made and no

attempt whatever to induce labor, but section advised. This was done on November 5.

She was under ether anesthesia. The omentum and intestines were found adherent at numerous points to a necrotic mass which was the remains of practically a full-term fetus within a necrotic sac apparently formed by the uterine wall, as it seemed continuous with the lower uterine segment. The mass was removed without great difficulty in spite of the adhesions as adherent sections of the necrotic sac were sacrificed. There was very little bleeding. Though there had been no indication of infection, because of necessity for leaving portions of adherent necrotic material *in situ*, cigarette drain was inserted and the abdomen was closed.

There was very little postoperative reaction, and patient made an uneventful recovery—out of bed on the sixteenth and discharged on the eighteenth day after operation.

The points of interest in the case were the death of the fetus at or near term (without known cause), followed, instead of by any evident attempt of the uterus to empty itself, by absorption of the liquor amnii and the ulceration of the macerated fetus through a necrosed portion of the uterine wall, all without causing any untoward symptoms in the patient or interfering with her normal life.

#### DR. WALT P. CONAWAY reported a case of **Placenta Previa Associated with Severe Toxemia.**

An Italian woman, thirty-five years of age, para iii, pregnant eight and a half months, was admitted to the Atlantic City Hospital, August 8, 1925, suffering from lobar pneumonia and acute nephritis. She was transferred to our service for the relief of her pregnancy, on August 11.

The first day in the Atlantic City Hospital her temperature was 103°, pulse 130, respiration 48. Only ten ounces of bloody urine, heavy with albumin, and containing many hyaline and granular casts, were obtained by catheter during the first twenty-four hours. Her blood pressure was 196/120.

She gave a history of two attacks of uremia and of having had a therapeutic abortion performed at three months about one and a half years ago, on account of acute nephritis. There was some uterine bleeding and a pelvic examination revealed a placenta previa. She was very toxic; this of course, rendered a surgical procedure all the more hazardous. Instead of inducing premature labor, I felt that a celiohysterotomy gave her more chances of recovery. We operated August 11 and removed a living male child which weighed about six pounds. Only a minimum amount of gas-oxygen anesthesia was used as her condition in the operating room was not at all satisfactory. The diagnosis of central placenta previa was confirmed at operation. The baby was resuscitated with some difficulty and much to our surprise the patient made an uneventful recovery. The pneumonia and the nephritis rapidly cleared up and she left the hospital August 27 with her baby, both in good condition, and only sixteen days after operation.

DR. F. E. KELLER read a paper on **Narco Local Anesthesia in Cesarean Section.** (See page 234.)

#### DISCUSSION

DR. COLLIN FOULKROD said he would not feel inclined to use such an anesthesia for cases in which general anesthesia was safe, for the shock to the patient of any extra pain that might be produced would be certainly more than

that produced by ether anesthesia in normal cases. Therefore he believed the procedure should be reserved for such cases as need ligation of tubes in tuberculosis or similar conditions where general anesthesia is contradicted.

DR. CLIFFORD B. LULL claimed that local anesthesia has a very definite place in obstetric surgery. His experience was limited to seven cases of cesarean section, but his conclusions were the same as Dr. Keller's. He always gives the initial dose of morphine and scopolamin and repeats the scopolamin before operation. One case necessitated general anesthesia before he got through the operation. In the first two cases he had a great deal of trouble because the assistant pulled up on the uterus trying to hold it up through the abdominal incision. Since then, Dr. Lull used Dr. Newell's technic of taking two darning needles and piercing the uterus with the ends protruding on the abdominal wall which holds the uterine ends fixed while doing repair work, thereby obviating any pulling on the peritoneum, which causes pain. In all of his cases there was definite indication for sterilization, which was done at the same time. None of these cases was shocked and all made a smooth postoperative recovery. Each case had very definite organic disease which absolutely contraindicated general anesthesia.

DR. EDWARD A. SCHUMANN said he would like to corroborate all the statements Dr. Keller made and indeed to go a good deal further. He felt he could answer some of Dr. Foulkrod's objections. One is apt to begin working with local anesthesia hesitatingly and with a good deal of lack of faith. Dr. Schumann did practically all his cesarean sections by a similar technic and there is incomparably less shock with local than general anesthesia. In regard to pain during operation, there is a marked variation in women as to their susceptibility and ability to bear pain. An hysterical, nervous woman will complain of pain to some extent. He did not find it necessary to give a general anesthetic excepting in one case in which the placenta was so densely adherent that traction upon the uterus was sufficient to require gas. The great majority of these women do not complain at all. They make no sound, they are usually a little too confused and intoxicated by scopolamin, but woman after woman will ask whether she hears her baby crying.

DR. PHILIP F. WILLIAMS read a paper entitled **Is the Sedimentation Test of Practical Value in Gynecology?** (See page 228.)

#### DISCUSSION

DR. JOHN A. McGLINN said that when Friedlaender and Wiesmann first brought out this work he carried out the test in all cases, but found it a useless procedure, which did not help to diagnose a single case. When it came down to the question of operability his experience was exactly the same as that of Dr. Williams. He therefore discarded the test after several years' trial.

# OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF MAY 6, 1926

THE PRESIDENT, DR. NORMAN L. KNIPE, IN THE CHAIR

DR. JAMES F. CARRELL presented a **Report of a Case of Uniovular Twin Pregnancy with Hydramnios.** (See page 243.)

## DISCUSSION

DR. ALICE WELD TALLANT cited a case of marked hydramnios with large branchial cysts in the fetus which obstructed delivery.

DR. CAMILLE J. STAMM reported a case in which the patient went almost to term, the uterus was extremely large. There was a vertex presentation, the cervix dilated well and when the membranes ruptured, over a gallon of fluid was expelled with the cord. An easy version was done, up to the shoulder. Further progress was halted by a swelling, in the neck, found to be a large branchial cyst involving the entire neck. He punctured the cyst on one side which allowed it to collapse so that the head could be extracted.

DR. J. STUART LAWRENCE said that some women have such a condition only once and there are other cases on record where it seems to be chronic. He had found nothing in the blood chemistry, but in two cases of hydramnios, chronic endometritis preexisted.

DR. WILLIAM ELY reported a case of **Spontaneous Rupture of Cesarean Scar Observed During Laparotomy for Second Cesarean.**

The patient applied to the Maternity Hospital in November, 1925, for care during her second pregnancy, expected to terminate March 6, 1926.

Patient had had rheumatic fever when nine and scarlet fever when sixteen years old. In March, 1924, she was delivered of her first child by cesarean section after a thorough trial of labor.

The heart was enlarged downward and to the left, with a distinct systolic murmur at the apex; abdomen, enlarged to size of six months' pregnancy, well healed scar 8 inches long in midline to left of umbilicus; pelvis, generally contracted. Wassermann negative.

In January patient complained of increasing dyspnea which was promptly relieved by digitalis. There were no other signs of cardiac distress. Blood pressure and urine remained normal throughout pregnancy.

Examination in February showed disproportion between the fetal head and the pelvis. Elective section was decided on, but as the baby seemed small it was decided to await the onset of labor.

February 27, the patient went into labor. Operation was started after first stage pains were well established. Under ether anesthesia, incision was made slightly to the right of the old scar. There was a large omental adhesion on the anterior surface of the uterus, bridging over the old scar. This was divided and as the site of the previous incision was exposed a small hematoma about 1 cm. in diameter appeared. This enlarged rapidly and in less than half a minute the old scar had

separated and the underlying placenta was exposed. Without further incision the child was delivered. After removal of the placenta and membranes the edges of the scar appeared as thick, healthy, bleeding muscle. The uterine muscle was sutured with interrupted sutures of No. 3, 30 to 40 day chromic gut and Pagenstecher stay sutures. The peritoneal coat was closed with a continuous suture of No. 2 chromic gut. Abdominal wall was closed in layers as usual.

The baby boy weighed 6 pounds, 11 ounces, and measured 48.5 cm. in length.

The patient made an excellent recovery. Highest temperature was  $100.2^{\circ}$  on the day following operation. Temperature normal on third day, going to  $99.8^{\circ}$  the fourth day and remaining normal after the eighth day. The patient suffered marked postoperative distention.

The following data regarding the first section was obtained from the Wilmington Homeopathic Hospital. The uterine muscle was sutured with 2 rows of No. 1 chromic doubled, the peritoneal coat with No. 1 chromic single. Patient had a febrile convalescence with temperature of  $101.6^{\circ}$  the day following operation and still at  $101^{\circ}$  on the seventh day reaching normal the ninth day. Patient complained of pain in the right leg the second day after operation.

This case again emphasizes the fact that all patients having a cesarean section should understand the importance of arranging for hospital care at all future pregnancies.

### DR. CAMILLE J. STAMM reported a case of Rupture of Uterus Following Induction of Abortion, Recovery.

Mrs. B. G., aged twenty-five, was admitted to the Jewish Maternity Hospital, May 4, 1924, at 6 P.M. with slight vaginal bleeding, pain over the entire abdomen, pain in the back, and general exhaustion. She had been married six years; general health good; two children living and well; normal labors. Menstruation normal, last period in December, 1923.

In August, 1923, when about three months pregnant, she had an abortion induced, bled for about one month, when she was curetted, and had rather a stormy convalescence.

The patient was now about in her sixth month of pregnancy, and on day of admission, May 4, 1924, arose as usual. At about 10 A.M., she was seized with a rather sharp pain in the abdomen, a sense of weakness, accompanied by slight vaginal bleeding. She called her family physician, who thought that probably she was going to abort, and he gave her an injection of morphine hypodermically. She slept most of the afternoon, and awoke about 5 P.M., complaining of feeling weak; her physician was called again. He was at once struck by her increased pallor, but her radial pulse was 80, and fairly strong, yet he suspected internal hemorrhage. Dr. Stamm was then called, and on vaginal examination found a slightly patulous os, uterus about the size of a six months' pregnancy, but slightly boggy at the fundus. He advised immediate removal to the hospital. Blood pressure was 75/55, pulse weak at the wrist, but the heart sounds were good; vaginal examination showed more dilatation of the cervix than at home, still the fundus presented the boggy feel. A Voorhees bag was inserted which was very shortly expelled. When he inserted his finger into the uterine cavity he found it empty, and a rent in the fundus near the right cornu. She was sectioned immediately and the entire product of gestation, intact, was found free in the abdominal cavity. The mass was removed, as were the comparatively few blood clots. Upon careful examination of the uterus, he found an old scar in the fundus near the right horn and the rupture had taken place through this. Because of her weakened condition, he excised the scar and put in three layers of sutures, rather than subject her to the more serious operation of



hysterectomy. She was then given a transfusion of human blood, 500 c.c., and recovered very rapidly. When discharged she was warned not to become pregnant again.

*Subsequent History.*—In spite of the warning she was again admitted to the hospital April 24, 1925, six months pregnant. Vaginal examination revealed, cervix obliterated, thickened, dilated two to three fingers, head floating, back to the left. Because of her previous history, and fear of a repetition of the uterine rupture, Dr. Stamm dilated the cervix manually, and did a podalic version, delivered a stillborn fetus, gave intrauterine douche and packed. She made a good recovery, and was discharged May 3, 1925, with the advice that she return for sterilization.

On December 23, 1925, she was admitted to the Medico-Chirurgical Hospital with the following history: Last regular period Sept. 18, 1925, nausea during the end of October and November, and irregular bleeding throughout the entire time. She had had a few chills, and on admission complained of vaginal bleeding, which continued until the twenty-sixth when she aborted spontaneously, but retained the placenta, which was removed without an anesthetic. She made a good recovery, and on January 6, 1926, Dr. Stamm again sectioned her and this time removed her appendix, and ligated both tubes with silk, double ligatures, excising the intervening portion of tube. At this operation he could not find the scar in the fundus, nor were there any adhesions. She made an uneventful recovery, and was discharged.

#### DISCUSSION ON THREE PREVIOUS REPORTS

DR. P. H. WILLIAMS believed that while the uterine muscle at the site of the old scar in Dr. Ely's case was undoubtedly as thick as is usually seen in any uterus after the child is extracted there must have been some weakening of the scar as a result of the febrile convalescence because the first section was done as an emergency measure after two days labor. There were also very extensive adhesions of the omentum to the uterine scar. He felt that the rupture was due to the fact that splinting of abdominal wall was removed from in front of the scar, because the hematoma followed retraction of abdominal wall and because the placenta had been located under the scar in this pregnancy. Holland reported some years ago that in 51 cases, the placenta in 34 was situated directly under the scar, and not under the scar in 17, showing predisposition to rupture when not so situated.

DR. J. O. ARNOLD some months ago reported at the Samaritan Hospital, six cases of complete or incomplete rupture of the uterus following former cesarean delivery. In at least two of these cases, on opening the abdomen the uterus appeared to be just on the verge of rupture, scarcely more than the peritoneal coat holding, so that the instant the knife touched the scar, the uterus burst open.

These cases showed that if labor had been allowed to come on, there would undoubtedly have been complete rupture at an early moment.

The significant point in all these cases was, that on looking up the records, each one had had some febrile temperature following the previous operation. However slight this postoperative rise in temperature, it always means infection somewhere, with the probability that it is in the uterine wound, and therefore such a patient will never be safe in a subsequent labor.

DR. W. W. VAN DOLSEN read a paper entitled *The Fallacy of the Present Day Treatment of the Postparturient Breast*. (See page 236.)

#### DISCUSSION

DR. GEORGE W. OUTERBRIDGE wanted to know whether these squares of gauze are kept constantly on the breast or whether the hypochlorite solution is removed, or whether the breast is washed off before the infant nurses.

DR. VAN DOLSEN in answer to Dr. Outerbridge said that hypochlorite is allowed to remain in contact with the nipple for one minute. The breast is then washed with sterile water before the infant is allowed to nurse.

DR. P. BROOKE BLAND read a paper entitled **Hydatidiform Mole Complicated by Perforation of the Uterine Wall and Secondary Chorionepithelioma of the Pelvis.** (See page 189.)

#### DISCUSSION

DR. PHILIP F. WILLIAMS considered it extremely difficult to tell when such growths are benign or malignant, when they are invasive and when they are not invasive. Three years ago he operated upon a young married woman of sixteen, who presented a slight toxemia and some bleeding. She had been married three months and the abdomen was the size of a six months pregnancy. The latter was removed, sections of tumor mass were subjected to two pathologists: one advocated the uterus to be removed, the other believed the condition to be benign. The subsequent history showed that the woman went along perfectly normally and delivered herself of a live child eighteen months ago. Another case of hydatidiform mole was found in a woman about the age of forty, with practically the same history of amenorrhea for three months, abdomen size of six months pregnancy. She had one normal period, second period came, did not stop, she returned to hospital for second follow-up, and realizing what might be present, we removed the uterus. At the posterior surface of fundus high up, there were three small purplish nodules. Although they were believed to be chorionepitheliomas, microscopic examination proved they were not.

DR. LEONARD AVERETT read a paper entitled **Nonspecific Protein Therapy in Gynecology.** (See page 238.)

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## NEW ORLEANS GYNECOLOGICAL AND OBSTETRICAL SOCIETY

*MEETING OF OCTOBER 14, 1926*

DR. W. D. PHILLIPS demonstrated the Parent forceps, a French modification of the Tarnier instrument which he had observed in use in the Petit Hospital in Paris. The instrument is essentially the same as the original Tarnier model, with the addition of tapes by which traction can be made in incomplete rotation in occipitoposterior positions. The demonstration in the French hospital had been a very dexterous one and the instrument apparently served a very useful purpose in this particular complication. The usual axis traction attachment was sold with this model and could be used if desired.

DR. P. B. SALATICH spoke on the importance of careful examination before operation and thorough exploration at the time of laparotomy.

As Dr. John B. Deaver has well pointed out, the keynote of all diagnosis lies in a carefully taken and interpreted history and a thorough examination of the patient, and in these regards there is no difference between surgical and medical diagnosis. The outstanding symptoms for which a patient seeks relief may be secondary to a primary lesion which is forgotten or unnoticed until it is revealed

by routine examination, and that same examination may reveal respiratory, cardiac or renal disease which absolutely contraindicates the proposed surgical procedure. These facts cannot be too emphatically stressed in this day when, as more than one writer has pointed out, the rush and hustle of big business are unfortunately being carried over into the practice of the medical profession.

Not only is the laboratory being relied upon more and more to make our diagnoses for us, but more and more also are we inclined to make our preliminary examination of the patient a perfunctory affair, with the feeling that when the abdomen is opened, we can get whatever information we need then. Dr. Salatieh more than once, in some of the larger hospitals of the country, had seen a surgeon operate upon a patient whom he was then seeing for the first time, and whose history and diagnosis he was then securing from the lips of his assistant. My own personal feeling, in some of these cases, was that a little more attention beforehand on the part of the surgeon would have eliminated some of this surgery, particularly where pelvic work was done.

In this connection it cannot be pointed out too often that in no case should laparotomy be advised for a woman until a careful pelvic examination has been made. H. Z. Griffin of the Mayo Clinic, where no patient is ever operated upon except by the surgeon who has himself worked up the case, comments on the fact that it is sometimes difficult to secure permission for such an examination, particularly in young girls. Not so many years ago, a woman who submitted to a pelvic examination without protest, was considered rather immodest, but fortunately today a saner view prevails, and such an attitude is at present considered false modesty. Indeed it is not unusual for patients to make the request for such an examination themselves. In those instances where the pelvic pathology is obscure or the examination difficult to make, examination under anesthesia should be done before operation is advised, and it is surprising how often this routine procedure will disclose the fact that laparotomy would be unwarranted.

The proper incision also plays an important part in the cure of a patient's condition. The buttonhole incision has a very small part in surgery today. In addition to the difficulty of securing proper exposure with this type of incision, the traumatism incident to pulling on organs just out of reach of the hand and the grave danger of hemorrhage, thorough exploration of the abdominal contents can never be done, and there is always a chance that there is present a condition considerably more serious than the one the operation is intended to remedy.

When Dr. Salatieh first began to operate he believed that patients were very particular about the type of incision employed and its length, and he made the Pfannenstiel incision whenever he could, but changed his plan after a douche of common sense. As he was explaining to one patient what he proposed to do for her, he added that he would place her incision so that it would never be seen; considerably to his surprise she replied that that was a decidedly minor point, as she had no intention of exhibiting her abdomen. He had always preferred the longitudinal incision, with its better opportunities for exploration, and from that day forth used it.

**CASE 1.**—Miss M. was operated upon for appendicitis through a two-inch incision without relief of symptoms. One year later, again through a small incision, she was operated on for supposed adhesions. When she experienced no relief after this second operation, Dr. Salatieh learned that she had a long history of menstrual disturbances, upon which no emphasis had been laid at her previous operations, and that no pelvic examination had ever been made for the old reason that "she was a young girl." She submitted to bimanual examination without protest and a marked retrodisplacement with bilateral cystic oophoritis at once revealed the obvious cause

of her continued pain and menstrual irregularities. Laparotomy for the correction of this pathology restored her to perfect health, a result which the first operation would have achieved if she had been properly examined at that time.

CASE 2.—A girl of sixteen was referred for operation for chronic appendicitis, and Dr. Salatieh was told by her physician that the diagnosis was quite definite, so that further examination was unnecessary. As her menstrual history revealed periodic pain, he advised rectal examination, to which she submitted without protest. The right ovary was twice its normal size, and the left the size of an orange. Laparotomy through a median incision was done, and while the appendix did prove to be chronically diseased, it was obviously secondary to the serious pelvic pathology which might have been entirely overlooked.

CASE 3.—Mrs. T. was advised to submit to laparotomy for multiple fibroids and cystic ovaries. There was no question as to the diagnosis, and her symptoms pointed to this pathology and no other. In the course of routine exploration, there was found a gall bladder full of stones, and a tumor, grossly malignant, attached to the free border of the ileum. At this sitting the pelvic work was done, the symptoms were so urgent that this could not be postponed, the tumor was removed, and six inches of the intestine on either side was resected. The laboratory confirmed the diagnosis of malignancy. Six months later cholecystectomy was done, and examination at this time showed the site of the intestinal operation in good condition, with no evidence of recurrence. Since then (April, 1920) the patient has been examined at intervals, although she has been entirely free from symptoms of any sort, always with negative results, but it is obvious that only routine exploration at the time of the first operation revealed the very serious pathology which would undoubtedly have shortened her life if it had remained undiscovered.

DR. A. H. GLADDEN, JR. presented the report of a tubal, an abdominal and a uterine pregnancy in the same patient in ten and one-half months. The condition which causes ectopic pregnancy in one tube very possibly is present in the opposite tube, and for this reason many capable gynecologists argue that if the patient's condition permits it, bilateral salpingectomy should be done at the time of operation for the original condition. Seligmann, however, after a review of the work of Giles, Essen-Møller and others, inclines to the opposite view, since one series studied showed 34 per cent of subsequent normal pregnancies as compared with 12.8 per cent of recurrent ectopics, while another and larger series showed that normal pregnancy occurred four times as frequently as repeated tubal pregnancy.

The consensus of opinion seems to be that in view of the fact that ectopic on the other side is not infrequent, bilateral removal of the tubes is safer for the patient, and that partial resection of the affected tube is most unwise, as a repeated pregnancy may occur on the same side.

*Case Report.*—L. G., colored female, age twenty-four, admitted to Charity Hospital Dec. 17, 1922, operated Jan. 5, 1923, discharged Jan. 16, 1923. Previous history negative. Menstrual history entirely normal. Last period one week before admission. Two full-term, normal deliveries, the last nineteen months ago. No miscarriages.

One week before admission she began to suffer from pain in the right lower abdomen. At first this was dull in character, but four days after the onset it suddenly became severe and was localized over McBurney's point. Flexing of the legs gave some relief. There was one attack of vomiting on the second day. The pain continued after admission, the last exacerbation being two days before operation.

There was slight pain and tenderness in the region of the right tube and ovary. Vaginal examination disclosed a definite, tender mass to the right of the uterus in the region of the tube and ovary.

Wassermann strongly positive. Urine negative. White cells 7,800, polys, 76 per cent, hemoglobin 85 per cent.

Operation was performed on a tentative diagnosis of chronic salpingo-oophoritis, possibly chronic appendicitis, under ether anesthesia. A large, subacutely inflamed appendix was found and later removed. The left tube and ovary were normal, as was the right ovary, but the right tube was enlarged and filled with blood, and was removed. The postoperative diagnosis of ectopic pregnancy was later confirmed by the laboratory, and later questioning of the patient revealed the fact that her last period before admission had been four days overdue. Convalescence uneventful.

July 23, 1923, this patient was referred to the Gynecological Clinic from the Surgical Clinic with the request for a pelvic examination. She stated that following her discharge she had been entirely well until a month ago, at which time, following a very severe pain in her right lower abdomen, she had had a prolonged fainting spell. There was no history of vaginal bleeding, but she had vomited in the morning for some days, and the attacks of pain had been frequent, sometimes twice a day. Her last menstruation had been March 15, 1923, this being the second period since her operation. Recently she had noted some enlargement of her abdomen.

Physical examination showed a palpable tumor mass in the right lower abdomen, about the size of a four and one-half months pregnancy, and vaginal examination showed this mass to be very soft and intimately connected with the uterus on the right. The cervix was soft, and the uterus was enlarged and soft. A tentative diagnosis of right ectopic pregnancy was made and she was admitted to the ward for observation.

Half an hour later, she was found in a state of complete collapse and almost pulseless. Rupture of the ectopic had evidently occurred, and the examination, although it was made gently and carefully, was felt to be responsible. Immediate laparotomy was done under light ether narcosis, bisecting the old scar. Both blood clots and fresh blood were present, the latter was removed with sterile laparotomy pads and later used for transfusion. On the right was a mass, the rupture of which revealed a fetus of about four months gestation. The right ovary was removed *in toto*, but the placenta, which was adherent to the posterior surface of the uterus, was not disturbed. The blood removed from the abdomen, which measured about 800 c.c., was clotted and strained, and was given intravenously while the patient was still on the table. Except that her temperature was at first very high, convalescence was without incident and she was discharged in good condition August 8, 1923.

February 23, 1923, this patient returned to the hospital complaining again of abdominal pain. Examination disclosed the presence of an apparently normal intrauterine pregnancy. She was delivered of a normal, full-term child August 30, 1924.

DR. P. B. SALATICI asked whether at the first operation the tube was merely ligated, or was a wedge-shaped piece removed? If simple ligation were done, the catgut might have cut through and the tube reopened.

DR. H. V. SIMS said that the most interesting feature of the whole case was the apparently positive proof of the transmigration of the spermatozoa. The right

tube, the site of the original pregnancy, was removed entirely at the first operation, yet the second pregnancy was on the right side also, and the spermatozoa evidently had to travel from the left tube through the pelvis to impregnate the ovum from the right ovary, which was left in situ. Another interesting point is that the patient did well after being transfused with her own blood.

DR. GLADDEN (closing) said it was routine on their service in surgery of the tubes to take a wedge out of the cornu of the uterus, and he did not believe that the second pregnancy could possibly have originated in the right tube. A somewhat similar case was reported by Fuchs, who considers the second pregnancy in his patient as of ovarian origin, on the same side as the original tubal pregnancy for which salpingectomy was done. In this instance Dr. Gladden first removed the right tube, and at the second operation, for the abdominal pregnancy, removed the right ovary. The left tube and ovary were thus left in situ, and the succeeding uterine pregnancy was perfectly normal.

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### Errata

In the article by Katherine Bement Davis, "Periodicity of Sex Desire" in the December issue of the Journal, the fifth line from the bottom of page 837 should read "sufficiently higher in *former groups*" instead of "latter group."

In the index of Vol. XII, December issue, report by Dr. John J. Gill, of a case of Choriocarcinoma of the Uterus Complicating Pregnancy, published in the August, 1926, issue, page 203, was inadvertently omitted.

# Department of Reviews and Abstracts

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CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

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## Selected Abstracts

### Gynecologic Diagnosis

**Bronnikoff:** The Method of the Blood Corpuscle Sedimentation Reaction and Its Importance to Gynecology. *Zentralblatt für Gynäkologie*, 1924, xlviii, 1483.

The writer draws attention to the variation in results obtained by using different methods in estimating the rapidity of red corpuscle sedimentation, and introduces a modified method which he believes of more certain value.

This modification makes the application of the test possible for practically every practitioner and adds a valuable method of diagnosis where there is a question of the presence of inflammation, particularly in the tubes. LITTLE.

**Falta:** The Use of Corpuscle Sedimentation in Obstetrics and Gynecology. *Zentralblatt für Gynäkologie*, 1924, xlvii, 1478.

Falta has made observations on the sedimentation time of red corpuscles in some thousand cases including patients at various periods of pregnancy and others affected by various gynecologic diseases. He believes that the procedure is of great value in diagnosis and concludes: Rapidity of sedimentation is constant in pregnancy after the fourth month. The value of the reaction increases with the advance of the pregnancy, but is of little value in estimating termination of the labor. For the first eight or ten days of the puerperium the sedimentation time remains much as during labor, but returns to normal at the conclusion of the third week. With impending abortion the sedimentation speed is more marked, and the same is true in subsequent endometritis. With inflammation of the adnexa the reaction is markedly increased, though where no virulent organisms are present it is normal.

For differential diagnosis between extrauterine pregnancy and tumor of the adnexa it is of doubtful value. With nonmalignant tumors the reaction is normal, with malignant tumors sedimentation speed is increased. In many cases of carcinoma the reaction is in definite relation to the development of the tumor, but this is not absolute. Recurrence may be recognized by changes in the reaction. LITTLE.

**Baer and Reis:** The Sedimentation Test in Gynecology. *Surgery, Gynecology and Obstetrics*, 1925, xl, 691.

It had been known for centuries that blood from a patient suffering from any inflammatory disease, if allowed to stand, would separate out into two portions, one serum and one erythrocytes, thus forming the "crusta phlogista" of the ancients, first described by Galen. Studies of sedimentation time throughout the different periods of pregnancy, labor and the puerperium, also in all forms of gynecologic pathology with special reference to the inflammatory conditions have been undertaken. It has been found that the sedimentation test is apparently of no value in the early diagnosis of pregnancy. It is useful in determining the presence or ab-

sence of infection in the body. With pelvic pathology a negative sedimentation test (a sedimentation time over two hours) conclusively rules out pelvic infection. The rate of sedimentation is directly proportional to the virulence of the infection. The test is a further aid in determining the safe time for operation. It seems a more delicate prognostic index, good or bad, than either the leucocyte or temperature curve.

WM. C. HENSKE.

**Nitschmann:** Our Experience with the Erythrocyte Sedimentation Test in Gynecology. *Deutsche Medizinische Wochenschrift*, 1925, li, 393.

The following criterion for this test was used: over three hours is normal, between two and three hours may be normal but usually is not, and under two hours is pathologic.

The test in forty-five cases of pelvic inflammation showed that the sedimentation time varied from eleven minutes to six hours and forty-five minutes. The test paralleled the temperature and leucocyte count except that the lessening in time for sedimentation occurred before the rise in temperature and white count and remained for a time after the other two symptoms had gone down. Therefore, the test is of value in predicting a rise in temperature and leucocytosis, and may be used to determine the favorable time for operation after they have subsided.

In tubal pregnancy the time is not lessened unless there is an inflammatory process or an hematocele present. Therefore, it may be of some value in the differential diagnosis between intact tubal pregnancy and salpingitis.

The majority of twenty-two cases of uncomplicated abortion had a sedimentation time of approximately one hour. This might be due to the loss of blood, a mild infection, or absorption from the dead fetus. Fifteen cases of abortion with fever had a time between fifteen and sixty-two minutes, most of them being between fifteen and twenty-five minutes.

Myoma cases showed an acceleration of sedimentation when they were complicated by anemia, necrosis or inflammatory processes. The same was true of ovarian tumors.

Cancer of the uterus showed an average of one hour. In general the operable cases took more than one hour and the inoperable less than that. In general malignant tumors of the genital organs showed an acceleration while benign tumors did not, but the difference was not clear-cut enough to be of value in differential diagnosis. Similarly there was not a great enough change to diagnose recurrences of cancer.

On the whole then this test is of value in diagnosing the activity of inflammatory processes and may become of value in differential diagnosis between benign and malignant tumors.

FRANK A. PEMBERTON.

**Silzer, O.:** The Blood Sedimentation Test in Gynecology. *Zentralblatt für Gynäkologie*, 1926, l, 353.

The test was used in almost every disease of the genitalia in an attempt to gauge its value. The writer concludes that operation for inflammatory adnexal tumors is not justified as long as the sedimentation time is below ninety minutes. Ectopic pregnancy and inflammatory diseases of the adnexa cannot be differentiated by the test when an internal hemorrhage is present because intraabdominal bleeding with subsequent resorption leads to shortened sedimentation time. A time of less than fifty minutes speaks for an adnexal inflammation, if an abdominal hemorrhage is absent. Initial cancers show normal sedimentation time, advanced cases a shorter one. Benign tumors and noninflammatory diseases of the genitalia show a normal average of five hours and twenty minutes.

GROVER LIESE.



Frosch: The Sedimentation Test in Obstetrics and Gynecology. The American Journal of Surgery, 1926, xl, 111.

The sedimentation test done by a special method according to Frosch has been of real value in determining the prognosis of a case. It lends help in the diagnosis and is of some value in deciding the time for operation. An increasing sedimentation time means that the patient is improving. A diminishing sedimentation time indicates that the patient is getting worse. This rule holds good for gynecologic and surgical cases. Any surgical patient who gives a sedimentation time of less than one-half hour requires an operation. The less the sedimentation time the graver the condition and the poorer the prognosis. He found the test of no value in the diagnosis of early pregnancy.

WILLIAM KERWIN.

Frommelt and Motiloff: The Blood Sedimentation Test in Gynecology. Zentralblatt für Gynäkologie, 1926, 1, 348.

The blood sedimentation test is only of value when used in conjunction with other clinical methods of diagnosis and prognosis. The possibility of ascertaining correctly the most favorable time for the operation of inflammatory tumors of the adnexa by itself justifies its extensive use. The following conclusions are based on experience with 1,000 cases: In inflammatory adnexal conditions operations should be postponed if the sedimentation time is less than one hour. In noninflammatory tumors of the genitalia an acceleration of the sedimentation time below one hour should induce us to search for concomitant diseases or to anticipate complications in operation. In carcinoma the test can be used to recognize early the presence of a recurrence which causes a shorter sedimentation time.

GROVER LIESE.

Frommolt: Dangers and Mistakes in Diagnosis in Using Perturbation. Zentralblatt für Gynäkologie, 1925, xlix, 126.

The writer draws attention to the fact that tubal insufflation is not without danger and that no satisfactory method has been devised for completely closing the external cervical os to prevent reflux of the gas used. He believes that a preliminary careful bacteriologic examination is of the greatest importance and stresses the danger of air embolism as a result of damage to the endometrium while the instrument is being passed into the uterus. Improper diagnosis resulted when there was apparent patency of the tubes in the presence of "sactosalpinx" and equally false deductions may be due to the presence of polypi in the uterus. Too forceful injection may also result in air invasion of the mesosalpinx.

LITTLE.

Hauch: Female Pelvic Neuralgias. Bruxelles-Médical, 1925, vii, 204.

The gynecologist is constantly consulted by women complaining of lower abdominal and pelvic pain in whom pelvic examination does not reveal sufficient pathology of the pelvic organs to account for the symptoms. Hauch feels that many of these patients are suffering from a neuralgia of the obturator or inferior pudic nerves. The etiology of these neuralgias may be either pressure from other pelvic pathology, pressure from scar tissue contraction as the result of previous pelvic disorders, or a true neuritis or infection of the nerves themselves. The diagnosis rests on an increase in pain when pressure is applied to these nerves during the course of a vaginal examination. The obturator nerve may be reached by pressure over the subpubic foramen, while sensitiveness of the inferior pudic may be ascertained by pressure just below the sciatic spine.

The treatment consists of rest, building up the resistance, and the application of heat. The use of iodine and ichthyol tampons has also been a valuable adjuvant. Treatments over a long period of time are often necessary, and a permanent cure should not be promised as recurrence may arise following chilling, exposure, or grippe.

THEODORE W. ADAMS.

Seymour, H. F.: Endoscopy of the Uterus. With a Description of a Hysteroscope. *British Medical Journal*, 1925, ii, 1220.

Rubin, of New York, has designed a hysteroscope which is a modification of the cysto-urethroscope of McCarthy and can only be used combined with gas inflation.

The author found that it was not necessary to have an angled tube. The next problem was to get rid of the obscuration of the view by blood and mucus. He constructed a hysteroscope based on the principle of the bronchoscope. In the wall of this tube are three channels, one for the rod which carries the light and one on each side for suction; either channel can be used for irrigation if need be. The hysteroscope is gently introduced; a swab on a sponge holder is used as an obturator, and this prevents the lamp becoming obscured by blood.

The author thinks that endoscopy of the uterus is going to prove useful in diagnosing the uterine causes of genital bleeding, since it can reveal such lesions as glandular hyperplasia of the endometrium, polypi, retained products of conception, chorionepithelioma and carcinoma. A piece of tissue can easily be removed for microscopic purposes by direct vision.

F. L. ADAIR.

Pollart, R.: Insufflation of the Tubes. *Bruxelles Médical*, 1926, xi, 353.

Pollart has supplemented carbon dioxide gas in tubal insufflation by filtered air. The air is introduced by means of a syringe which is connected to a mercury manometer, for recording the pressure. He feels that this method is simpler and fully as satisfactory, since 100 c.c. of air are easily and quickly absorbed.

The greatest value of the method is in determining nonpatency of the tubes in sterility cases where other means of examination reveal no pathology. It has also proved useful in the treatment of certain types of dysmenorrhea. However, it should be used only as an adjuvant to all other methods of gynecologic examination. Twenty-two cases of tubal insufflation are reported.

THEODORE W. ADAMS.

Adler, L.: Uselessness of the Term "Metropathy." *Wiener klinische Wochenschrift*, 1925, xxxviii, 605.

Adler objects to the term "metropathy" which Aschoff and Pankow introduced to describe certain uterine hemorrhages found in women whose genitalia are apparently normal. The term is useless in that it describes the condition no better than does the term "uterine bleeding," it is useless because the underlying cause must be determined before the condition can be correctly treated, and the term is incorrect because the cause of the bleeding lies, not in the uterus, but elsewhere.

He also objects to the term on the ground that no two men have the same clinical picture in mind when using it and quotes, at the two extremes, Schroeder and Sellheim. Schroeder considers it to be a persistence of the follicle with a cystic glandular hyperplasia of the uterine mucosa and Sellheim thinks of it in terms of structural changes of the uterine mucosa and musculature without a functional disturbance, or of functional disturbances alone, or of a combined picture of structural and functional disturbances. Doederlein and Kroenig speak of "metropathia inflammatoria chronica" in cases in which any inflammatory reaction can no longer be demonstrated.

Adler does not believe it necessary to have one term for so many different clinical pictures and feels that more effort should be spent in trying to determine the anatomic picture and the underlying pathology than on the nomenclature. The hemorrhages due to local anatomic changes must be sharply differentiated from those due to functional derangements.

RALPH A. REIS.

Schil: True Hemorrhagic Metritis and Its Treatment. *Journal de Médecine de Paris*, 1923, xxv, 503.

In the light of recent investigations, many of the cases formerly designated as "hemorrhagic metritis" can now be more accurately ascribed to an ovarian hypofunction, to pelvic congestion or other pathologic states. There remains, however, a certain number of cases exhibiting uterine hemorrhages where no definite pathology can be found. For these he uses the term "true hemorrhagic metritis."

By using the uterine endoscope he is able to recognize four types of endometritis: the villous, the fungoid, the polypoid and the cystic. He emphasizes the necessity of ruling out a beginning uterine malignancy in these cases.

Three methods of treatment exist: The chemical which consists in the intrauterine application of some caustic substance as zinc chloride. While giving good results in the majority of cases it is a dangerous method, terminating fatally in one of his cases. For this reason Schil has abandoned this method. The second method is the intrauterine use of radium. This, the author also states, is a dangerous and unsatisfactory procedure. The third type of treatment and the one now advocated by Schil is dilatation and curettage. This not only effects a cure in the majority of cases but permits a microscopic examination of the removed curettings.

THEODORE W. ADAMS.

Seitz, A: The Causes and Treatment of Gynecologic Bleeding. *Klinische Wochenschrift*, 1925, iv, 1920.

The most essential thing in determining the cause of gynecologic bleeding is an exact general and especially menstrual past history. The author recognizes three types of uterine hemorrhage: (1) Hypermenorrhea—the individual period is profuse, longer than normal, or both. The menstrual cycle is normal. (2) Polymenorrhea—profuse bleeding with a shortened interval, the interval often being irregular. (3) Metrorrhagia—continued irregular bleeding of no definite type. There is an irregularity both of interval and duration.

Hypermenorrhea is caused by: (1) Disturbance of blood supply. (a) Passive hyperemia in the lesser pelvis, (b) Active hyperemia. (2) Localized disturbances in the uterus. (a) All conditions which decrease contractility of uterus cause a more profuse menstrual flow, (b) hypertrophy of endometrium, possibly due to hyperovarianism. (3) Abnormally long clotting time of blood due to constitutional causes. (4) Malposition, especially retroflexion.

Usually the uterine mucosa and ovary are normal, at most there might be an interstitial endometritis. Biopsy might reveal tuberculous endometritis or malignancy. A negative finding rules out any local cause for the bleeding.

The author emphasizes the following general rules for the treatment of hypermenorrhea: (1) Anomalies of blood distribution should be corrected. (2) Habits, where faulty, must be regulated. (3) Inflammation should be relieved either by physical and dietetic treatment or, if necessary, by operative interference. (4) Malpositions of the uterus are to be corrected. (5) In plethora and arterial hypertension one may use hydrotherapy or at times venesection. (6) For local disturbances of the uterus curettage and ergot are employed, also for infantile and hyperplastic

uterus but then together with administration of ovarian preparations, or calcium for special cases.

Polymenorrhea may occur as the result of derangement in the cyclic changes of the ovary, which may be caused by functional disturbances in correlated endocrines, especially thyroid, and by alterations of the ovarian parenchyma due to inflammatory processes in the genital tract. There may be no visible pathologic changes in the histologic pictures of ovary and uterine mucosa. They are found simply to correspond to the state of the shortened interval; or, if there is a disturbance in the cycle, especially of the secretion phase, with very irregular intervals, then one might see a distinctly altered anatomic picture. For treatment, above all, the basic cause must be ascertained, whether it is an inflammatory process or an endocrine disturbance.

Metrorrhagia has as causes: (1) During the period of sexual life, usually a disturbed pregnancy. (2) Juvenile and preclimacteric metrorrhagia are often due to marked disturbance in ovarian function. (3) Metrorrhagia at any time of life may be caused by benign or malignant tumors.

ADAIR AND SAFFERT.

Moulonguet-Dolérès, P.: Metrorrhagia Caused by Tumors and Cysts of the Ovary Occurring After the Menopause. *Gynécologie et Obstétrique*, 1924, ix, 493-514.

While the majority of metrorrhagias developing after the menopause are due to carcinoma of the uterine body, they are not uncommonly caused by the development of an ovarian neoplasm which produced phenomena in the uterus, tending to restore the activity of this organ. However, ovarian tumors developing after the menopause do not always cause metrorrhagia, since they were found in nineteen out of seventy-four cases studied. The prognosis of metrorrhagia of ovarian origin is good if the causal tumor itself is nonmalignant. The treatment should be surgical. The removal of tumor and uterus is generally necessary.

The ovarian tumors producing these hemorrhages are extremely varied in regard to size, location, and nature, but reaction within the uterus is the same, hemorrhages, leucorrheal secretions, and hyperplasia of the mucosa, which sometimes may lead to the formation of polypi. This hyperplasia of the senile mucosa differs from the hyperplasia of the genital period in two respects, (1) absence of glands which have a serrated appearance, and (2) the cells of the stroma are not transformed into decidual elements through hyperplasia of their protoplasm.

It has been suggested that phenomena of senile reactivation of the uterus are due to an irritation of nerve plexuses of the hilum of the ovary which, due to anastomoses with laterouterine plexus and hypogastric ganglion, may have a trophic influence on the uterus. The author was unable to confirm this by animals experimentation.

FRED L. ADAIR.

Sellheim: Metroendometritis and Metropathy. *Deutsche medizinische Wochenschrift*, 1924, xlix, 707 and 748.

The author feels that the terms, endometritis, metritis, metroendometritis, and metropathy are too indefinite.

Under endometritis two groups can be differentiated. One is characterized by definite changes in the endometrium and uterine wall caused by gonorrhea, pyogenic infections, tuberculosis, and retained products of conception. The cardinal symptoms are discharge, bleeding, and pain. The treatment is well established. The other is characterized by the same symptoms often accompanied by general discomfort and vague complaints but no characteristic pathologic changes are found in uterus or ovaries. It seems to be due to a disturbance in the relation of the endometrium to the general organism through the internal secretions of ovary and other organs.

Senile endometritis, coming on at the menopause, is an example. It is usually worse after an artificial menopause resulting from radiation or operative castration. Functional disturbances at puberty have a similar cause. This may be called metropathy. Its etiology, course, treatment and curative results are still indefinite.

This second type is found in women who do hard work. Normal menstruation and endometrial secretion depend on a normal sexual life. Women doing men's work usually do not lead such a life. Other etiologic factors are sexual perversions; abnormal sexual stimuli as found in the theater, dancing, etc.; too little or too much cohabitation; the various methods of contraception and especially coitus interruptus. The author believes that avoidance of normal childbearing is an important factor in causing functional derangements.

Metroendometritis and metropathy are not sharply differentiable. The former begins as a local anatomic change, the latter with functional derangements leading secondarily to local anatomic changes. The best treatment for metroendometritis is curettage, but incidentally also the whole sexual life should be brought back to normal.

FRANK A. PEMBERTON.

Andrews, H. R.: Backache in Women. *British Medical Journal*, 1925, ii, 1207.

The following is a rough and ready classification of some of the causes of backache: (1) Disease or injury of some of the tissues of the back. This class emphasizes the importance, in the diagnosis of backache, of not trusting to abdominal, vaginal, rectal, and bimanual examination alone but examining the back itself. (2) Fatigue. A very large number of the chronic backaches of women are due to fatigue of the back muscles, often increased by weakness of the abdominal muscles and the consequent drag of the abdominal viscera. (3) Enteroptosis. Together with, or apart from, the fatigue element backache may be caused by enteroptosis and by enlargement of the abdomen from any cause. (4) Tumors, obesity. It is obvious that large ovarian and uterine tumors may cause backache by their weight, without any inflammatory changes, as may also a large collection of free fluid. (5) Carcinoma of the uterus and of the rectum. In some cases of this kind backache may be of almost intolerable severity. (6) Disease or infection of the kidney. Pyelitis or pyelonephritis is an exceedingly common condition, and often is not recognized until the patient has suffered from it for a long time, and has been uselessly treated for various conditions mistakenly held responsible for the backache. (7) Retroversion of the uterus. In the author's opinion, retroversion of the uterus without any fixation is sometimes responsible for backache. He does not believe that uncomplicated retroversion in young single women and in the elderly causes backache or calls for operation, and thinks that retroversions which cause backache would become less common if more care were taken during the puerperium to prevent the malposition. (8) Prolapse of the pelvic contents. A warning must be given once more against concentrating on treatment of weakness of the pelvic floor or retroversion of the uterus in cases in which almost all the abdominal viscera as well as the pelvic organs are sagging down.

F. L. ADAIR.

Dougal: Chronic Backache in Gynecology. *Lancet*, 1924, ii, 1220.

In this series of 1,000 patients he found that 235, or about 23 per cent, complained of backache, and that it was the principal symptom in one-third of this number.

The diseases found to be most commonly associated with backache were: genital prolapse, chronic cervicitis, endometritis and metritis, adnexal and periuterine inflammation, uterine fibroids, adenomyoma, and cancer of the cervix. Retroversions and retroflexions of the uterus, in the opinion of the author, do not play a predominant part in producing backache, except so far as they are associated with chronic endometritis, etc.

All operated cases were followed up as to the effect on this particular symptom. Replies were received from 152 patients, of which 62 had had no backache since the operation. Forty-two were much improved and 41 were no better. Seventy-three per cent of backaches associated with a gynecologic abnormality were cured or much relieved by appropriate surgical treatment.

The importance of backache in uncomplicated retroversion and retroflexion has been much exaggerated, as it is found, almost as frequently, in cases where the uterus is in a forward position. The most important factor in producing backache is fatigue of muscles.

Where there is a definite indication for surgical treatment the backache can be cured or much relieved in over seventy per cent of cases, the results being especially good in cases of prolapse treated by colporrhaphy.

NORMAN F. MILLER.

**Huet: Rupture and Perforation of Pyosalpinx into the Peritoneal Cavity.** *Journal de Chirurgie*, 1924, xxiii, 123.

The frequency of ruptured pyosalpinx, as given by various authors, differs widely, but it certainly cannot be classed as a rare occurrence.

Rupture may be caused by direct trauma of some kind or may be due to the lighting up of an old infection. In the first type, there is found a distinct tear in the tubal wall, while in the second, the aperture is more of the nature of a perforation, being due to the formation of perforative ulcers. In ten cases of rupture due to trauma there were only three deaths but in twelve perforations eight deaths.

These perforations vary greatly in size and shape and often are surrounded by a necrotic zone. They are usually single but in one case two openings were found. The rupture occurs most frequently in the ampulla of the tube.

The principal symptoms are severe pain, collapse, pallor, chills, and acceleration of pulse, followed by a steady rise in temperature, nausea and vomiting. The onset follows immediately the trauma in the cases of true rupture while in the cases of perforation the characteristic symptoms may not be present for several days. There is a marked rigidity of the abdomen with abdominal tenderness and lack of motion on respiration.

Rupture of the bladder, ruptured appendix and ruptured tubal pregnancy must be considered in the differential diagnosis.

Where the diagnosis is made early, operation is clearly indicated. If, however, the condition has progressed to the stage of abdominal distention, the prognosis is extremely poor. When the collection of pus is more or less localized and low down in the pelvis a posterior colpotomy is the operation of choice. This, however, implies the danger of leaving the infected tube as possible source of reinfection. Therefore, in those cases where laparotomy is necessary to reach the pus, he advocates a removal of the tube. Following all such laparotomies he inserts a drain at the lower end of the incision down into the culdesac.

THEODORE W. ADAMS.

**Tixier and Rochet: Salpingitis in Elderly Women.** *Archives Franco-Belges de Chirurgie*, 1925, xxviii, 659.

In patients from thirty-five to forty-five years of age salpingitis assumes an extremely grave aspect. It occurs unexpectedly both in women who have previously had a genital infection, and in those in whom there is no trace of previous infectious pathology. In the latter type there often exists a source of latent infection such as a degenerating fibroid or small local infections. In elderly women salpingitis is cured but seldom by medical treatment and the prognosis is always poor even so far as life is concerned. The treatment of choice is total hysterectomy as at this time of life the symptoms of postoperative menopause are negligible.

THEODORE W. ADAMS.

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## Original Communications

### FACTORS INFLUENCING END-RESULTS IN CARCINOMA OF THE CERVIX AFTER IRRADIATION\*

BY ROBERT A. KIMBROUGH, JR., M.D., AND CHARLES C. NORRIS, M.D.,  
PHILADELPHIA, PA.

CARCINOMA of the cervix is the most frequent malignant neoplasm in the female genital tract. The ultimate mortality varies from 50 to 90 per cent. It is obvious, therefore, that no satisfactory method of treatment has yet been evolved. Of the various procedures employed radical hysterectomy or irradiation gives the best results. In cases in which the growth is definitely limited to the cervix, the two methods yield practically equal end-results. In all cases in which the tumor has extended beyond the cervix, however, irradiation is the method of choice.

Satisfactory comparison of end-results is extremely difficult because of the lack of uniformity in classification of cases and in standards of cure. At the University Hospital the classification suggested by Schmitz<sup>1</sup> of Chicago has been employed.

Stage 1 includes those cases which are definitely limited to the cervix; Stage 2 includes the cases of borderline operability; Stage 3 cases are those which are definitely inoperable; Stage 4 comprises cases in the terminal stage; Stage 5 includes cases of recurrent carcinoma after hysterectomy. This classification is to be recommended on account of its simplicity and the fact that it is based upon clinical data.

Any standard of cure is arbitrary, but freedom from symptoms after a five year period is the most generally accepted criterion. Quinquennial records are for many reasons preferable to the shorter three year studies.

\*Read (by invitation) at a meeting of the Brooklyn Gynecological Society, May 7, 1926.

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."



There is definite need also for a uniform method of dealing with untraced cases in the preparation of statistics. The European method of counting such patients as dead is unfair to American surgeons. On account of the strict enforcement of registration laws existing in most European countries, few cases cannot be traced. This small number stands in marked contrast to the many untraceable patients in this country. The method recently adopted by Ward and Farrar,<sup>2</sup> of excluding lost cases from their report, seems a logical one, and has been employed by us.

It is a well-recognized fact that in other parts of the body tumors respond with marked variability to the effects of irradiation and that in many cases a more or less definite prognosis can be formulated from the histologic study of the type of neoplasm. Thus the basal-celled tumors of the skin melt away under irradiation and the squamous-celled type is always more or less resistant. The same may be stated for some types of sarcoma.

Our investigation was undertaken in an effort to explain the difference in response of various cases of cervical carcinoma to irradiation. It has been the experience of every gynecologist who employs radium in the treatment of cervical carcinoma, that some cases, indeed the majority, respond well to this form of treatment, but that occasional clinically identical cases are encountered which are almost if not entirely unaffected by irradiation. Our study comprises a combined clinical and histologic review of 120 cases and in addition a clinical review of 263 cases in another series.

The selection of cases for the clinical and histologic study has been an impartial one, as our only criteria were sufficiently detailed follow-up data and well-preserved tissue for microscopic study. Many of our earlier cases could not be included, for one or the other of these reasons. However, in recent years we have been able to follow over 90 per cent of our cases of carcinoma and a biopsy is done on every patient at the time of treatment.

The longer series of 263 cases includes all the cases of cervical carcinoma which had been treated by irradiation in the gynecologic clinic of the University Hospital prior to May 1, 1921.

Cervical cancers may be divided into two general types, namely, the epidermoid and the adenocarcinoma. The epidermoid types arise from the modified skin of the portio vaginalis and vary widely in their histologic characteristics. The adenocarcinomata arise from the glandular epithelium of the cervical canal and are of fairly uniform histologic structure.

The subdivisions of the epidermoid type are practically those of the normal skin of the portio vaginalis. In this study we have followed the classification suggested by Martzloff<sup>3, 4</sup> the spinous or prickle-celled, the fat spindle or basal-celled, and the transitional-celled types.

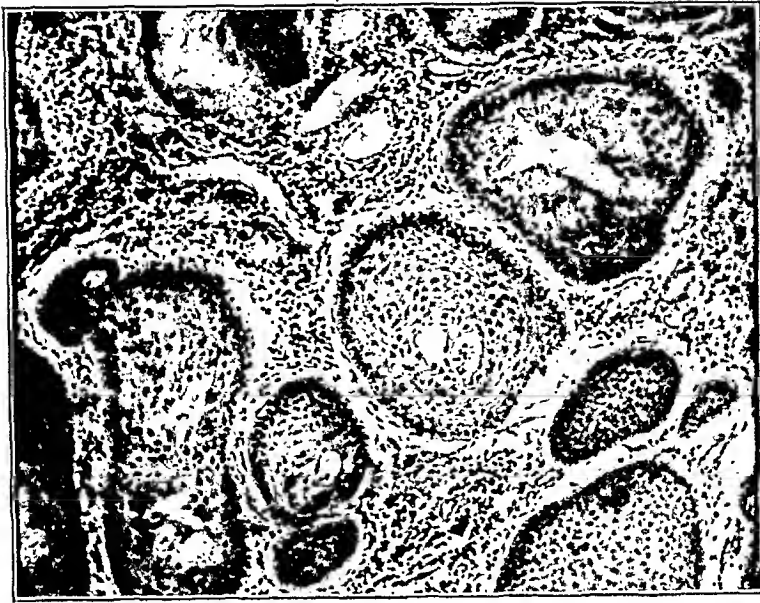


Fig. 1.—Prickle-celled type. The prickle-celled type is the most highly differentiated form of cervical cancer. The structure of the normal skin is closely reproduced. Epithelial pearls are often present. The tumor is characterized by a relatively large amount of connective tissue. Prickle cells are easily distinguished under a high-power objective. Mitosis is less frequent than in the less differentiated types. Polynuclear changes and hyperchromatosis are also less marked. Keratinization is generally well marked.



Fig. 2.—Basal-celled type. The basal-celled type is the most rapidly growing and the least differentiated of the cervical carcinomata. Mitotic figures are numerous. The nuclei vary widely in size and in staining characteristics. Many of these tumors bear a close resemblance to sarcoma.

The prickle-celled (Fig. 1) is that in which the flat, keratonized prickle cells predominate. Epithelial pearls may or may not be present. This type of cell bears a close resemblance to the most adult cells of the normal skin. The tumors in which prickle cells predominate are relatively differentiated.

The fat spindle or basal-celled (Fig. 2) closely resembles the germinal layer of the normal skin. The individual cells are young and reproduce so actively that the histologic picture closely resembles that

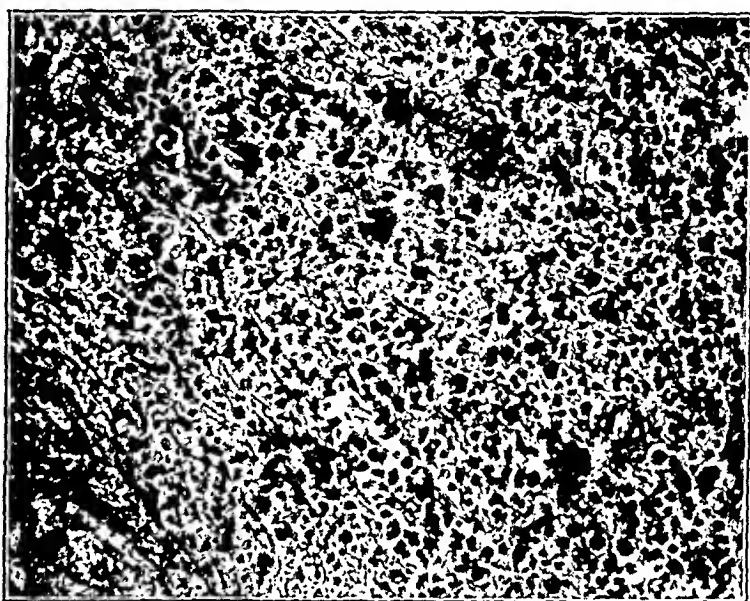


Fig. 3.—Transitional-celled type. The transitional type lies midway between the basal and prickle-celled types. Many characteristics of both forms are seen.

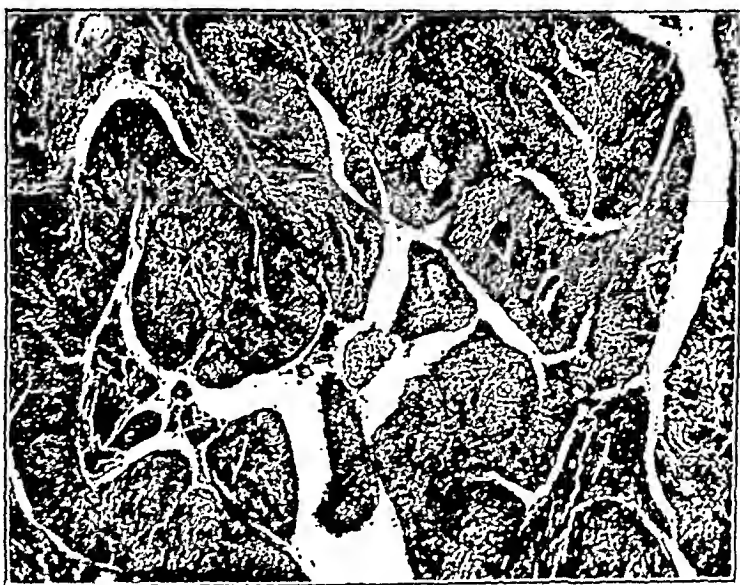


Fig. 4.—The mixed form. In this type of carcinoma there seems to be an attempt to reproduce all the layers of the normal skin. In some areas differentiation is well advanced, and in other locations groups of basal cells are seen.

of embryonal tissue. These tumors exhibit little or no tendency to differentiate into the normal skin structure. Many areas are found which have a sarcoma-like appearance.

The transitional type (Fig. 3) is made up of cells similar in charac-

ter to the midlayer of the skin. There is a moderate but limited tendency to reproduce the normal structure. This type stands between the prickle-celled and the basal-celled types in its histologic appearance.

We feel that these three types are distinct pathologic entities and remain the same throughout their existence and throughout the entire tumor. They may, however, be altered by environment, degenerative changes, and by irradiation.

To the above described three types of epidermoid carcinoma may be added a fourth variety which we have designated as the mixed form (Fig. 4). This tumor partakes of the characteristics of any two or all of the previously described varieties. It is often difficult to classify



Fig. 5.—Adenocarcinoma. The adenocarcinoma has its origin in the mucosa of the cervix, and there is a definite attempt to reproduce a gland bearing structure. Adenocarcinoma possesses the usual characteristics of cancer in that there is an irregular proliferation of glands which penetrate without regard to surrounding structures. The epithelium is columnar but rarely maintains the high goblet-like character of the normal cervical cells.

this form, but in our tables such tumors have been assigned to the group in which the predominating cell belongs.

The adenocarcinomata (Fig. 5) are easily distinguished from the epidermoid types. We have made no subdivision of this group as the histologic structure is practically uniform.

The relative malignancy of the various histologic types constituted our original line of study. This study was based on the degree of extension of the growth within a given time after the onset of symptoms.

Table I indicates the relative number of operable and inoperable cases in each of the histologic types within six months after the onset of symptoms.

TABLE I

TYPE	STAGE 1	STAGE 3
Prickle	29.5%	54.5%
Basal	25 %	58.3%
Transitional	17.6%	82.3%
Adenocarcinoma	60 %	40 %

On this basis the carcinomata in which the transitional cell predominates, are the most malignant. The adenocarcinomata extended least rapidly of any of the types which were studied.

The next step was to determine the variation of the histologic types in their response to irradiation.

According to the law of Bergonie and Tribondeau, young, highly cellular neoplasmata respond readily to irradiation and adult differentiated tumors are more resistant. Complete healing at the site of the growth three months after irradiation has been our criterion of satisfactory immediate response to treatment.

Table II shows the immediate results on this basis.

TABLE II

TYPE OF CELL	NO. OF CASES	HEALED LOCALLY AT THE END OF 3 MONTHS
Prickle	70	54.3%
Basal	19	57.9%
Transitional	29	41.3%
Adenocarcinoma	7	57 %

The basal-celled type presented evidence of the best immediate results.

The final criterion is, of course, the number of cases in each histologic group living and free from symptoms five years after irradiation.

Table III shows the five year salvage in reference to the histologic characteristics.

TABLE III

TYPE OF CELL	NO. OF CASES	FIVE YEAR SALVAGE
Prickle	25	28 %
Basal	10	20 %
Transitional	13	25 %
Adenocarcinoma	6	42.8%

In Table III the percentage of five year cures is higher than in our total series. This is, in all likelihood, due to the small number of cases, but we feel that the statistics are worth while as a *relative* index of response of the various histologic types.

In the epidermoid groups there is comparatively little difference in the end-results. This is probably due to the fact, that while the basal-celled tumors are more malignant, they respond more readily to treatment. The prickle-celled tumors are extremely resistant to irradiation, but are of a relatively low grade of malignancy. The

crossing of these two factors produces a practical equality of end-results.

Having found the study of the histologic characteristics of little prognostic value, our next effort was to determine the relationship between the degree of extension of the growth and the ultimate end-results.

Table IV shows the percentage of cases which presented complete local healing three months after treatment.

TABLE IV

STAGE	NO. OF CASES	PER CENT HEALED
1	42	73.8
2	11	45.5
3	67	41.8
4	5	40

As would be expected, the best immediate results were obtained in those cases in which the carcinoma was confined to the cervix.

Table V indicates the percentage of mortality five years after irradiation.

TABLE V

STAGE	NO. OF CASES	PERCENTAGE OF MORTALITY
1	27	63
2	23	87
3	121	86
4	52	98.1
5	39	87.2

Table VI is complementary to Table V in that it shows the percentage of patients living and well five years after treatment.

TABLE VI

STAGE	NO. OF CASES	PERCENTAGE OF 5 YEAR CURES
1	27	37
2	21	13
3	121	14
4	52	1.9
5	39	12.8

It will be noticed that the results in Stage 3 were slightly better than in Stage 2. This discrepancy may probably be accounted for by the comparatively small number of cases of borderline operability.

These results may be made more emphatic when tabulated according to the numerical chance of cure in each of the stages. (Table VII.)

TABLE VII

CHANCE OF FIVE YEAR CURE IN RELATION TO EXTENSION	
Stage 1	1 to 3
Stage 2	1 to 8
Stage 3	1 to 7
Stage 4	1 to 50
Stage 5	1 to 8

TABLE VIII

CLINICAL TYPE OF GROWTH	NO. OF CASES	PER CENT OF FIVE YEAR CURES
Papillary	19	31.5
Infiltrating	109	12.8

The next line of study was the relationship of the clinical type of growth to the end-result. Two general types were described, the papillary or cauliflower, and the infiltrating types. The gross appearance was described in 128 cases which had been treated five or more years ago. The papillary type constituted only 14.8 per cent of the entire series of cases. Table VIII shows the number of five year cures in each of these groups.

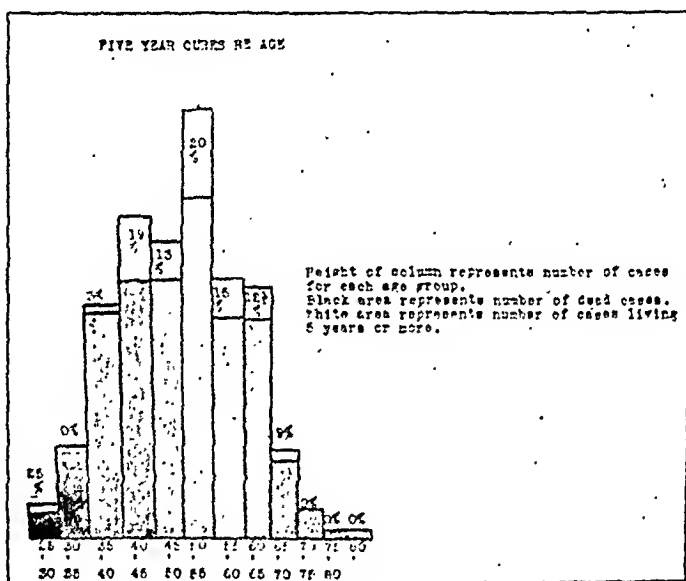


Fig. 6.

Our final study was to determine the relationship between the age of the patient when first treated and the ultimate result. This relationship is shown in Fig. 6.

In this series the best results were found in patients between the ages of fifty and fifty-five years. The patients under the age of forty and those over the age of sixty-five years responded poorly to irradiation.

#### CONCLUSIONS

##### A. Histologic Characteristics—

1. The fat spindle or basal-celled tumors appear to be the most malignant.
2. The best immediate results were found in the basal-celled type.
3. The best end-results were obtained in the prickle-celled tumors.

4. The high grade of malignancy of the basal-celled tumor is probably offset by its greater susceptibility to irradiation so that the end-results are practically the same in all of the histologic types.

*B. Extension of the Growth—*

1. As would be expected, the best results were obtained in the Stage 1 cases. The ultimate mortality increased in direct proportion to the extent of the disease at the time of the first treatment.

2. Of the cases of recurrence after radical hysterectomy 12.8 per cent were living and well five years after irradiation.

*C. Clinical Type of Growth—*

The papillary form of cervical carcinoma gives a somewhat more favorable prognosis than the infiltrating variety.

*D. Age of Patient—*

1. The best results were obtained in patients between the ages of fifty and fifty-five years.

2. The patients under forty and those over sixty-five years of age responded poorly to treatment.

*E. General End-Results—*

1. The total five year salvage in 263 cases was 13.7 per cent.

2. The stage of the disease at which treatment is instituted is decidedly the greatest prognostic factor in cancer of the cervix, and is more important than the histologic type of the growth.

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(For discussion, see page 399.)



## KRUKENBERG TUMORS AND THEIR PRACTICAL PROBLEMS\*

BY JULIUS JARCHO, M.D., F.A.C.S., NEW YORK CITY

(Attending Gynecologist and Obstetrician, Sydenham Hospital; Attending Gynecologist, Beth David Hospital and Home of the Daughters of Abraham)

IN 1896 Friedrich Krukenberg,<sup>1</sup> of Marburg, described the fibrosareoma ovarii mucocellulare (carcinomatodes), a slow growth which apparently originated in the ovaries, affecting both simultaneously, and which was found in young and old alike. Enlargement of the ovaries resulted, without alteration of form or contour. On the cut surface solid portions are intermingled with myxomatous areas; the latter subsequently soften, and then cysts are formed. The spindle-shaped ovarian stroma cells proliferate as in sarcoma; among them may be found large and small groups (of cells) which contain mucinous protoplasm and resemble epithelial cells. Krukenberg stated, moreover, that the tumor propagates along the lymphatics, a property possessed by cancer. Despite the fact that he discovered the transition from ovarian stroma cells to mucinous quasi-epithelial cells, he believed that the tumors in question, five cases in all, belonged to the malignant connective tissue growths.

Since that time all ovarian tumors which enlarge the ovaries uniformly without distortion, which present alternations of fibrous areas with mucinous-cell groups, and which propagate along the lymphatics, are called Krukenberg tumors.† It is now known, however, that these tumors are not always primary ovarian and that slow growth is not an invariable characteristic.

Leopold<sup>3</sup> observed the simultaneous occurrence of gastric carcinoma and bilateral ovarian tumors. According to Bueher,<sup>4</sup> coexistent with bilateral ovarian carcinomas, a primary carcinoma is often to be found in the stomach. Heinrichs<sup>5</sup> pointed out that after the primary carcinoma of other organs, ovarian metastasis formation is of great importance, because it often leads to wrong diagnosis and frequently to unwarranted interference.

Schlagenhauser<sup>6</sup> showed that most Krukenberg tumors are not primarily ovarian but rather metastases of abdominal organs, e.g., stomach, intestinal tract, or biliary ducts. This observation brought to light work done earlier than that of Krukenberg. Thus Bode<sup>7</sup> in 1895 had described fibrosareoma in ovaries of women previously operated on for pyloric carcinoma. In 1896 Fleischmann<sup>8</sup> reported to the Royal Medical Society of Budapest the extirpation of bilateral ovarian tumors which seemed to be fibrosareoma myxomatodes, the postmortem revealing pyloric carcinoma. This observation was confirmed by Temesváry<sup>9</sup> from his own experience. Kötschau<sup>10</sup> operated on a woman of fifty-two for bilateral ovarian tumor; the autopsy showed carcinoma of the stomach. Waldyer<sup>11</sup> found carcinoma at the same time in stomach

\*Based on the author's studies in the Pathology Department of the Szent István Hospital of Budapest, Chief Dr. J. Baló, Privat-Dozent of the University of Budapest.

†These should not be confused with peritoneoma of one Richard Krukenberg.<sup>2</sup>

and ovaries, in his opinion both were primary. In all these cases the ovarian carcinoma may have been not simultaneous with the gastric carcinoma but rather a subsequent metastasis of it, with alterations in structure caused by reaction of the ovarian stroma.

Although instances are recorded where the primary or secondary, i.e., metastatic, character of the ovarian tumor was not established, either because primary growths were not sought in the gastrointestinal canal or because no autopsy was performed, yet there are cases in which careful search uncovered no carcinomatous tumor in the gastrointestinal canal. Therefore Krukenberg tumors should be divided into those which have a primary origin in the ovaries and those which arise secondarily by metastasis of abdominal carcinoma, e.g. of stomach, intestines or bile ducts. Marchand,<sup>12</sup> in whose institute Krukenberg's researches had been performed, asserted positively in 1919 that the first of Krukenberg's original five cases was a primary ovarian tumor, as also was a case observed very accurately by Schenk,<sup>13</sup> one reported by Glockner<sup>14</sup> and one reported by himself. In this last case Marchand found primary Krukenberg tumors in the extirpated ovaries of a fourteen-year-old girl, although no autopsy was made.

Marchand proposing to change the name fibrosarcoma mucocellulare carcinoma-todes to carcinoma mucocellulare opposed K. Sternberg's theory<sup>15</sup> of the endothelial origin of primary Krukenberg tumors and declares them to be carcinomatous and derived from the follicle or the germinal epithelium, both of which according to Walthard<sup>16</sup> have a tendency to pseudomucinous transformation. Marchand is here supported by G. W. Outerbridge,<sup>17</sup> who reported a similar case, which he believed to be a fibrosarcoma with myxomatous degeneration, and declared that these ovarian tumors are not always of metastatic origin.

According to Miller,<sup>18</sup> up to 1918 Major<sup>19</sup> collected fifty-five cases of Krukenberg tumor and Frankenthal<sup>20</sup> in 1921 had the same number, whereas Schlagenhauser as early as 1902 had collected seventy-nine, including eight of his own, of which he regarded sixteen as primary in the ovaries, but only six were subjected to autopsy, and of these only two had stomach examination.

It is of great practical importance to determine whether a Krukenberg tumor is primary or secondary. Schlagenhauser advises that during operation for bilateral ovarian tumors careful examinations of abdominal organs be made. In operations for carcinoma of the stomach examination of the ovaries is absolutely of the first importance. According to Schauta,<sup>21</sup> if this operation discloses ovarian tumors the uterus and adnexa must also be removed since metastases along the lymphatics occur earliest in the genital organs. Hence in such cases removal of stomach, uterus and adnexa gives the best results. According to H. O. Neumann<sup>22</sup> during the operation for ovarian carcinoma search must be made in other organs for primary carcinoma, which if found must be removed. Ewing,<sup>23</sup> who studied five cases of Krukenberg tumors and one primary carcinoma with myxomatoid areas, inclines to the belief that pure Krukenberg tumors are always secondary.

Cases are recorded where the latent gastric carcinoma was first detected during operation for extirpation of ovarian tumors. That good results may be obtained in such cases with radical operations of the stomach following removal of ovaries corroborates the observation of Frankenthal, who removed the ovaries of a thirty-six-year old woman, then resected the stomach. Nine months afterward the patient was in good health and no morbid alterations could be detected. The observation of Frankenthal moreover accords with the opinion of Schauta. Schenk and Sitzenfrey<sup>24</sup> found the infiltration of the uterus and ovaries as metastases of gastric carcinoma. Frankenthal fails to specify just what sort of operation was done where the ovaries were removed, an important consideration, as the work of O. Frankl<sup>25</sup> shows. Frankl examined the uterus in eight cases out of twelve in which carcinoma of the ovaries accompanied primary carcinoma of the gastrointestinal canal and found

microscopic metastases. In the same group of people metastases occurred three times in the fallopian tubes and once in the wall of the vagina. Frankl also examined thirty-six cases of primary ovarian carcinoma and found the uterus and tubes grossly and microscopically free from metastases. He states that ovarian carcinoma is not necessarily followed by metastases in uterus and tubes and that therefore metastases found in the uterus after gastrointestinal carcinoma connected with ovarian metastases originate not from the ovaries but from carcinoma of the gastrointestinal canal. He believes furthermore, that while ovarian metastases are likely to cause large-sized tumors, the uterine growth remains microscopic, and in such cases advises total extirpation instead of removal of the ovaries with or without supravaginal amputation of uterus.

Since the work of Frankl performed over many years and on a wide range of material has been a great contribution towards our understanding of these tumors, one hesitates to contradict even in the smallest detail, yet the following observations lead to conclusions which differ widely from those of Frankl on the same problem. In this connection I desire to report seven cases, five from the Pathological Department of the Szent István Hospital, Budapest, one supplied through the courtesy of Dr. B. Johan of the Hospital of the Jewish Community of Pest, one from the Laborer's Hospital of Pestujhely by the courtesy of Dr. Ö. Naehtnébel.

Only the essential facts of the histories are here presented.

**CASE 1.**—Mrs. M. A., age fifty-two years, admitted to gynecologic service of Zita Hospital, Budapest, June 14, 1926. First menses at sixteen years. Six children, no abortions. Last normal menses two years ago. Since then had irregular bleeding for the relief of which she entered the hospital. Examination showed a woman of medium height, undernourished. On percussion there was a flatness in the abdomen which was fluctuating and directed with convexity downward. Vaginally a solid mass was palpable in the small pelvis, the lower border at level of the linea terminalis and continuous with the left cornu of the uterus. It filled the vesico-uterine space, the upper limit being two fingers below the umbilicus. Laterally the mass extended to the wall of the pelvis on the left side and on the right to the midline. Uterus of moderate size, anteфлекed, retroverted and movable. In the region of the left sacrouterine ligament small nodules were felt. Patient had a rectocele.

*Diagnosis.*—Neoplasm of the left ovary.

*Operation.*—July 2, 1921, by Professor Scipiadès, median incision, peritoneum found thickened and studded with small nodular formations. Peritoneal cavity contained two liters of clear, greenish-yellow serous exudate. Left ovary enlarged to size of newborn infant's head. Right ovary size of pigeon's egg. Bilateral salpingo-oophorectomy performed. Diagnosis at time of operation suggested as carcinoma of both ovaries and carcinosis of peritoneum.

*Pathologic Examination.*—Left ovary 15.5 cm. long, 9 cm. wide and 3 cm. thick. The tube was imbedded in the ovarian mass. The capsule of the ovary was maintained. Surface of ovary was irregular. The right ovary simulated the former but was smaller. Histologically in the left ovary there was a network of connective tissue in some places rich in spindle-shaped cells. Between the connective tissue were groups of epithelial-like cells which in some places contained nuclear divisions and in many places presented mucinous changes. The cytoplasm of these cells stained slightly blue with hematoxylin. There were mucinous masses in which only

a few nuclei were found. There was a transition from the above mucinous cells to connective tissue cells. The left tube contained, in the axis of the folds, groups of signet-ring cells. The latter were similar in appearance to the mucinous cells found in the left ovary. The right ovary contained fewer mucinous cells, but some scars and the graafian follicles were still observed. On the basis of this examination a Krukenberg tumor was diagnosed. The patient died two weeks after the operation with cachexia and pneumonia.

*Report of Autopsy.*—Fibrous carcinoma of the stomach infiltrating almost the entire wall of the stomach. Carcinosis of peritoneum with adhesions of the intestines. Moderately severe arteriosclerosis, chronic myocarditis, beginning hypoplastic pneumonia.

CASE 2.—B. K., age forty-six years, single, admitted to VII Internal Department of Szent István Hospital, Oct. 22, 1922, nullipara. Menses irregular for last four years. Three years previously was treated in a hospital for some gastric disturbance and discharged as well. One month previously began to have pains in both sides of the chest and was coughing.

Patient of very small stature, 138 cm. tall, bony frame, frail, tremor of the fingers and dragging of the legs when walking. Lumbar vertebra sensitive to touch. All reflexes normal. Heart narrow, peripheral blood vessels hypoplastic and patient looked older than her age. Thyroid could not be felt. Uterus size of a newborn infant's head, anteflexed, movable. Abdominal organs negative.

*Clinical Diagnosis.*—Myoma of uterus and dysharmonismus.

Patient died Dec. 20, 1922.

*Autopsy.*—Fibrous carcinoma of small curvature of the stomach with metastases in ovaries. Wall of stomach 1 cm. thick at the lesser curvature and was infiltrated by a tumor of white color. No ulcerations. Left ovary (Fig. 1.) 12 cm. long, 8 cm. wide and 6 cm. thick. Surface smooth but presented several depressions and elevations. Cut surface was in general whitish-grey and some places appeared translucent while in others there were yellowish areas of necrosis. Right ovary 12 cm. long, 5 cm. wide, 3 cm. thick. The external and cut surfaces were smaller to the left side. Chronic fibrous pneumonia (carnification). Hypertrophy and dilation of right heart, slight degree of hydrothorax, hyperemia of abdominal organs.

*Histologic Examination.*—The mucosa and submucosa, as well as muscular layer of stomach, infiltrated by tumor cells, which formed smaller groups. Form of the tumor cells atypical, cytoplasm vacuolated. In surface layer both ovaries contained fibrous connective tissue which penetrated into the substance. The connective tissue fibers separated by groups of cells of which the cytoplasm was light. Nuclei were pushed to the side by vacuoles and cells had a slight signet-ring shape. Mucicarmine stained the vacuole pinkish. In fallopian tubes and uterus no tumor found, but in the fornices nearer to the paracolpium places were found where the connective tissue spaces were filled by smaller groups of tumor cells.

CASE 3.—Mrs. E. S., aged thirty-one years, admitted to the II Internal Department of Zita Hospital, Oct. 19, 1922. Family history irrelevant. Complained of stomach trouble. In 1921 exploratory laparotomy was done on account of her stomach complaint but findings were negative. A few months after operation she still had pains and therefore reentered the hospital.

*Examination.*—Abdomen depressed. In right iliac fossa circumscribed resistance with irregular outlines could be felt. On left side above sigmoid was a mass the size of a man's fist which had the consistency of cartilage and appeared to emerge from the small pelvis. It seemed to be adherent to the uterus. Liver, spleen and thoracic organs negative.



Fig. 1.—Case 2. Enlarged ovaries connected to normal-sized tubes and uterus. Note normal ovarian indentations with smooth surface between.



Fig. 2.—Case 3. Photomicrograph. Mucous membrane of fallopian tubes. In folds, solid groups of epithelial cells; cytoplasm light in places because of mucinous changes.

*Clinical Diagnosis.*—Carcinoma of the cecum.

*Autopsy.*—Scirrhus carcinoma of smaller curvature of stomach size of a palm of a newborn infant and superficial ulceration of the mucous membrane. Tumor adherent to pancreas and liver, metastases of the perigastric and mesenteric lymphatic glands. Metastasis of ovaries. Right ovary the size of newborn infant's head; left the size of man's fist. Surface smooth but irregular. Tumors of the ovaries were solid but in the right ovary there was a cyst with a smooth inner surface the

size of a walnut. Both ovaries entirely free from adhesions. Bronchopneumonia of inferior lobe of right lung, fatty degeneration of the heart, slight ascites. Scar above umbilicus from medial laparotomy of previous operation.

*Histologic Report.*—Superficial part of the mucosa of the stomach destroyed by ulceration. At this place smaller groups of epithelial cells penetrated into wall of stomach and could be traced between the muscle fibers. Beside the groups of tumor cells there were fibroblasts, lymphocytic and plasmocellular infiltration. The tumor cells contained large vacuoles making them light. The tumors of the ovaries contained atypically arranged groups of cells with mucinous degeneration. In other places the cells were arranged in groups like glands. The epithelium of these gland-like structures was irregular. The stroma between the glands contained spindle-shaped cells lying close together. Both tubes were infiltrated by groups of epithelial



Fig. 3.—Case 3. Lymphatic vessels infiltrated with carcinoma cells around artery of fallopian tubes.

cells. These groups could also be found in the folds of the tubes. Besides the wall of the tubes such cells were to be found in the mesosalpinx (Fig. 3) especially in the lymphatics along the blood vessels. In the uterus, especially in the external layers between the muscle fibers and sometimes in spaces lined by endothelium, were solid masses of epithelial cells (Fig. 4). Both mucous membrane and serosa free from epithelial cells. In the bladder wall between the muscle fibers were small groups of epithelial cells. In some places these cells were limited in number (Fig. 5).

CASE 4.—Mrs. S. K., aged thirty-six years, admitted to the VIII Internal Medical Department of Szent István Hospital, June 9, 1925. First menses at fifteen years. Two children; one abortion seven years ago. After the abortion she was seized with cramps during the night, bit her tongue, and became unconscious. Eight months after this she had another similar attack, evidently epileptic in character. Of late the attacks were more frequent and at time of admission occurred

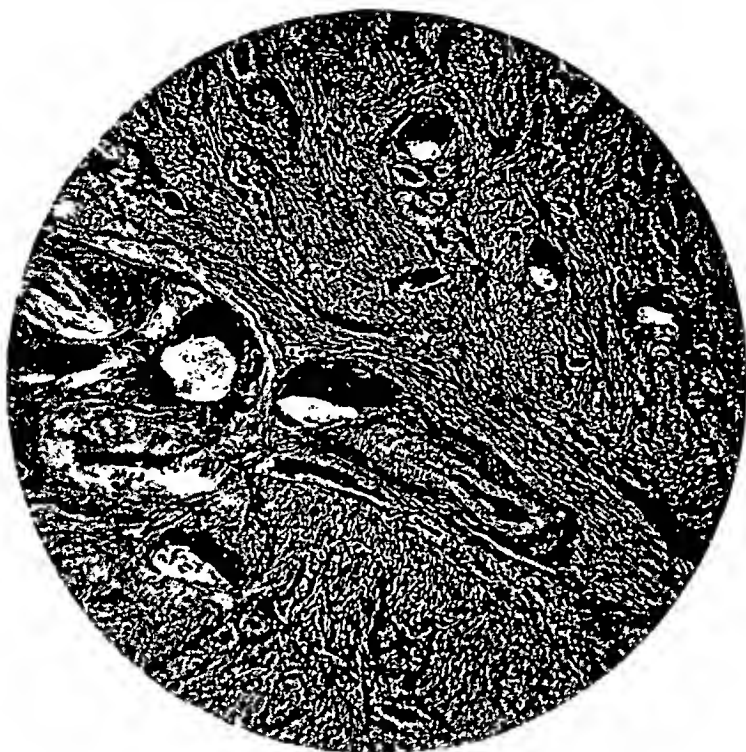


Fig. 4.—Case 3. Small groups of epithelial cells filling lymphatic vessels around blood vessels in muscular wall of uterus.



Fig. 5.—Case 3. Carcinomatous infiltration of wall of urinary bladder. Groups of epithelial cells penetrate between muscle fibers.

every two weeks. Abdomen had been growing larger for the last three weeks. She had a fever irregularly and bowels were also irregular.

*Present Status.*—Abdomen large with signs of fluid. The flatness changed with the change in patient's position. Pleural cavity contained a serous exudate. The abdominal and pleural exudates were aspirated several times but the cavities refilled. On objective external examination no other symptoms or lesions could be found. Pelvic examination presented a bilateral swelling of the appendages.

*Clinical Diagnosis.*—Tubercular polyserositis. Patient died April 1, 1926, of exhaustion following repeated aspirations.

*Autopsy.*—On the smaller curvature of the stomach an ulcer was found, oval in shape, measuring 7 cm. in length and 5 in breadth, with edges very much thickened. This thickening extended almost over the entire wall of the stomach. Serosa of the stomach thickened in some places and presented pinkish-white patches.

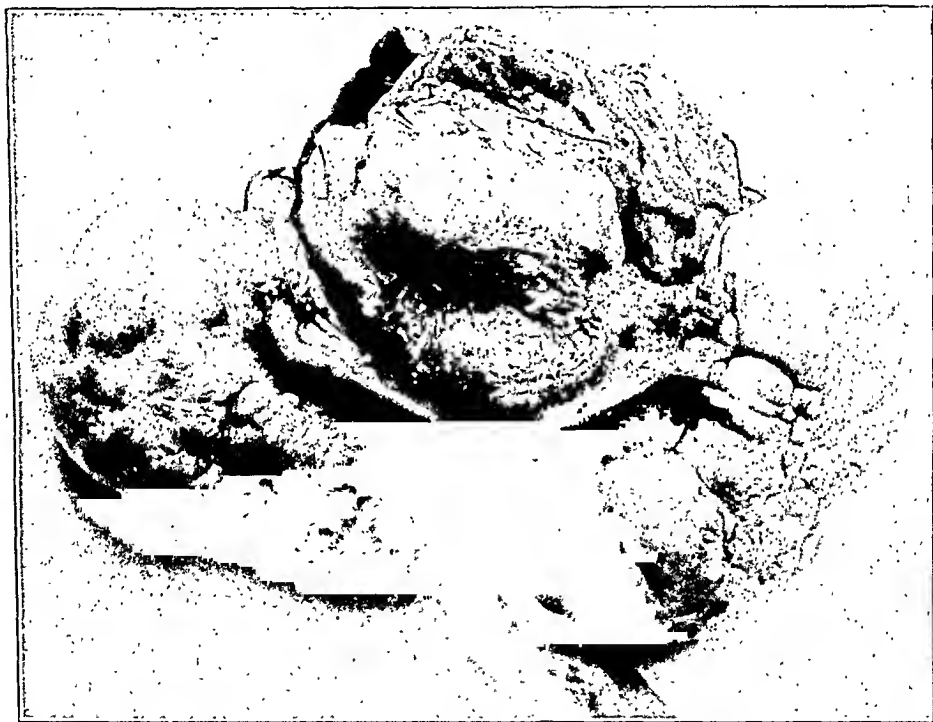


Fig. 6.—Case 4. Shrunken bladder, tubes thickened at ampulae, fimbriae not matted together, rectum collapsed. Ovary on each side greatly enlarged, but not adherent and with normal contour.

Left pleura covered in areas by nodules the size of lentils. On right side the pleural cavity contained a circumscribed area of exudate corresponding to the inferior lobe and above that there were adhesions. On left side the entire pleural cavity was filled by a serous exudate. The same was found in the abdominal cavity. Both ovaries (Fig. 6) presented an enlargement the size of a man's fist. These enlargements were uniform and the ovaries retained their original shape. The tubes were also thickened but the fimbriae were free. The peritoneal covering of the gall bladder and Glisson's capsule irregularly thickened. The root of the mesentery thickened. In the lungs, under the pleura were white thread-like branching lines like the branches of a tree. These were the infiltrated lymphatics. Bicuspid valve thickened and covered by fine verrucous deposits.

*Diagnosis.*—Fibrous carcinoma of stomach, metastases of ovaries and fallopian tubes, propagation of carcinoma to the mesentery and peritoneum, and lymphangitis



carcinomatosa of the lungs. Recurrent verrucous endocarditis. Chronic fibrous pericarditis, hemorrhagic infarction of the spleen.

*Histologic Report.*—Both ovaries contained a connective tissue stroma which was edematous in places. In the stroma were embedded single or grouped cells of mucinous cytoplasm resembling signet rings. There were necrotic areas present. In the fallopian tubes were found the same mucinous cells between the muscle fibers, and especially in the folds of the tubes. Bladder wall contained the same mucinous cells forming diffuse or group-like infiltration. This infiltration could be found under the mucous membrane as well as between the muscle fibers. The parallel muscle fibers were separated by stripes of mucinous cells.

CASE 5.—Mrs. F. L., aged fifty-two years, admitted to the Pajor Sanitarium, Ang. 22, 1925. Six children. Five abortions. Last confinement seventeen years prior. Six weeks before admission to the hospital she noticed that the abdomen had become large and felt a mass there. At the same time she began to have profuse vaginal bleeding causing weakness for which she sought relief. Examination revealed an enormous neoplasm in the abdomen, which seemed to be a bilateral ovarian tumor. The uterus was free and there was fluid in the abdominal cavity.

*Operation* (Prof. Hülte).—Median incision. Serous fluid in abdominal cavity. Right ovary multilocular, size of man's head. The appendix, 18 cm. long, passed in front of the pedicle and was adherent to left abdominal wall. Left ovary as large as the head of a newborn child. Loops of small intestines found adherent to left ovary. Posteriorly these tumors were adherent to the rectum. A bilateral salpingo-oophorectomy was performed.

*Pathologic Examination* (Dr. J. Baló).—The right ovary was as large as a man's head and on the surface was a cyst the size of a hen's egg. The external surface was smooth. On the cut surface were several cysts the size of hen's eggs and between the cysts the tumor substance was transformed to gelatinous masses. In these gelatinous areas nodules the size of millet and peas could be observed which were firmer in consistency. The left ovary was the size of a newborn infant's head and most of it was occupied by a cyst. The wall of this cyst was of fibrous connective tissue about 2 to 3 mm. thick. In one place the capsule contained bone. Cyst was filled with a jelly-like substance containing hair. Left tube was studded with nodules pearl-like in appearance, the size of peas, arranged in series of chains.

*Microscopic Examination.*—The solid part of right ovary presented denser or looser connective tissue in which groups of cells were embedded. These cells contained very light mucinous cytoplasm and nuclei pushed to one side. In some places real epithelial cells were found. Degenerated cells contained not fat but mucin. The wall of the left ovary consisted of fibrous connective tissue. Cavity of the cyst contained debris and hair. The left tube contained in its wall and in the folds groups of mucinous cells which corresponded to the pearl-like formations.

*Diagnosis.*—Fibrous carcinoma.

The right ovarian tumor presented structures similar to those of Krukenberg tumors. The mucinous cells were arranged more in groups than diffusely. The left tumor was a dermoid cyst but the left tube was also infiltrated by the new formation. The patient was discharged in apparent good health from the sanitarium, Nov. 7, 1925, then disappeared and could not be traced.

CASE 6.—Mrs. S. M., aged fifty-five years, admitted to the Hospital of the Jewish Community of Pest, Nov. 6, 1924, gynecologic service of Dr. Berezseller. Ten children, two abortions. Amenorrhea of five months. In the last two years menses irregular, every two to three months. In 1921 diagnosis of

gastroptosis made by a doctor. One month prior to admission patient was seized with an attack of severe abdominal pain; at that time was compelled to remain in bed and the pain was relieved by hot applications. One week before admission to hospital a physician made a diagnosis of tumor of the abdomen.

*Present Status.*—Externally abdomen presented a resistance of which the upper limit was four fingers' breadth above symphysis, to the left it reached the crest of the ilium and to the right the middle line. Bimanual examination revealed that posterior fornix was depressed by the tumor. Uterus anteverted and movable, to the left of it a tumor the size of a hen's egg could be felt and to the right of the uterus a large movable mass.

*Operation.*—Nov. 13, 1924, median incision. Double salpingo-oophorectomy.

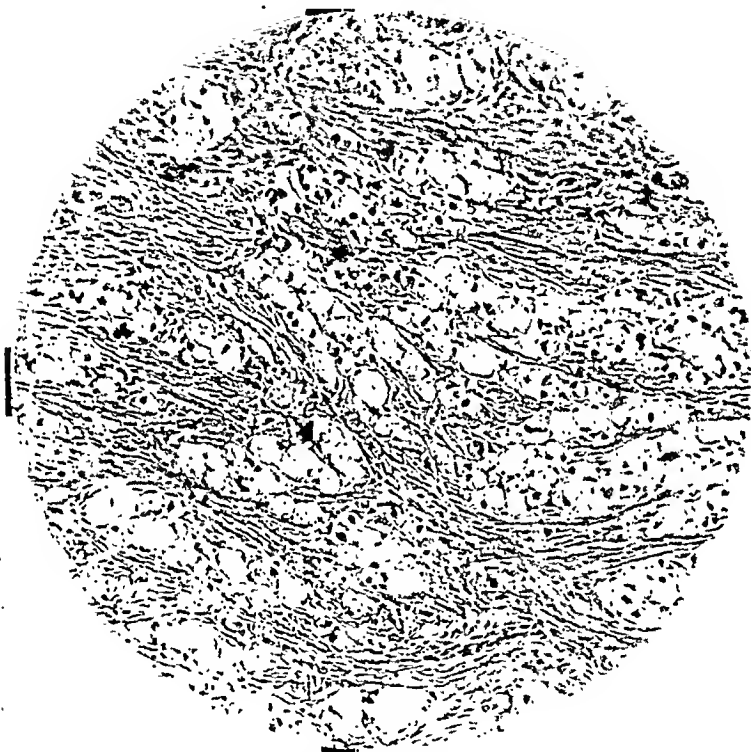


Fig. 7.—Case 6. Ovary, typical structure of Krukenberg tumor. Note signet-ring cells between fibrous connective tissue.

*Pathologic Report.*—Right ovary size of hen's egg, its surface contained nodules size of nuts and peas. On cut surface were small cysts filled with jelly-like substance. Left ovary greater than a fist in size. On the surface could be observed nodules similar to those on the right ovary and one the size of a hen's egg. On the cut surface this ovary presented, besides the cysts, large uniformly white masses between which was fibrous connective tissue. Some of these cysts were filled with coagulated blood. The sections prepared of both ovaries histologically presented the same structures, the only difference being that in the smaller right ovary the epithelial groups were more crowded and less connective tissue was found between them. In this ovary were gland-like ducts of which the epithelium was very irregular. In some areas were multiple layers where the epithelial cells possessed light granular cytoplasm and often had the signet-ring appearance (Fig. 7). In many places the glandular character of the masses disappeared and large masses occurred in which the cytoplasm of the cells was mucinous. In the

left ovary the structure was very similar but the glandular structure was less dominant.

*Diagnosis.*—Adenocarcinoma mucinosum of both ovaries.

Following the operation patient presented signs of progressive ileus which led on the fifth day to a laparotomy for its relief. This was performed Nov. 18, when general peritonitis was found. Patient died an hour after the operation.

*Autopsy.*—Perforation of stomach carcinoma.

Histologic examination of the thickened wall of stomach surrounding perforated ulcer showed that all layers of stomach were infiltrated by epithelial cells, in smaller and larger groups. Nuclei dark, very little cytoplasm in some cells; in other places it was light and granular. There were also cells wherein the cytoplasm contained a large mucinous droplet (Fig. 8), which pushed the nucleus to one side. Thus



Fig. 8.—Case 6. Cross section of stomach wall. Muscle fibers separated by groups of epithelial cells with mucinous changes in cytoplasm.

in the stomach the expected carcinoma was histologically proved. It was gelatinous, resembling the carcinoma found in the ovaries. On the basis of these histologic findings in the ovaries and stomach the connection of both was self-evident. The primary carcinoma in the stomach must have given rise to metastases in the ovaries.

**CASE 7.**—E. V., single, aged thirty-three years, admitted to the Internal Department of Laborer's Hospital at Pestújhely Dec. 15, 1925. First menses at 12 years. No children, no abortions, no leucorrhea. For the last two years lost appetite. Nine weeks previously pain in epigastrium, choking feeling in throat and vomiting following indiscretion in a meal. Had been very ill for one week and confined to bed for four weeks. Since then could not retain food and entered the hospital for relief of this condition.

*Present Status.*—Emaciated, poorly developed female. Skin pale, lymphatic glands not palpable. Tongue coated. Thoracic organs negative. In epigastrium there was



Fig. 9.—Case 7. Stomach totally infiltrated with fibrous carcinoma as far as lower part of esophagus. Note stenosis at cardia, with superficial ulcerations below; also folding of mucous membrane and thickening of entire wall.



Fig. 10.—Case 7. Bladder and genital organs. Uterus split mesially, ovaries and tubes free, both ovaries slightly enlarged as result of carcinomatous metastases.

felt a resistance size of a walnut. Liver, gall bladder and spleen not palpable. A test meal could not be carried out as it was impossible to introduce a stomach tube.

*Roentgen Ray Examination.*—The opaque meal could not be swallowed by patient. The lower part of esophagus was distended, antiperistalsis. The opaque meal was vomited. After administration of papaverin injection the obstruction was still present. Since the patient could not swallow, she was receiving nutrient enemata. Died Jan. 9, 1926, of emaciation.

*Autopsy.*—Stomach (Fig. 9) was very much contracted, about the size of a child's stomach. Length of lesser curvature 13 cm. Larger curvature 28 cm. Inner surface thrown into folds which were most marked on the fundus. Cardia constricted. Above cardia was an area of the esophagus 7 cm. in length which was also very much thickened and folded. Above this area nodules the size of lentils gave the inner surface of the esophagus a rough appearance. Below cardia on posterior wall of stomach an area 6 cm. long and 4 cm. wide presented superficial

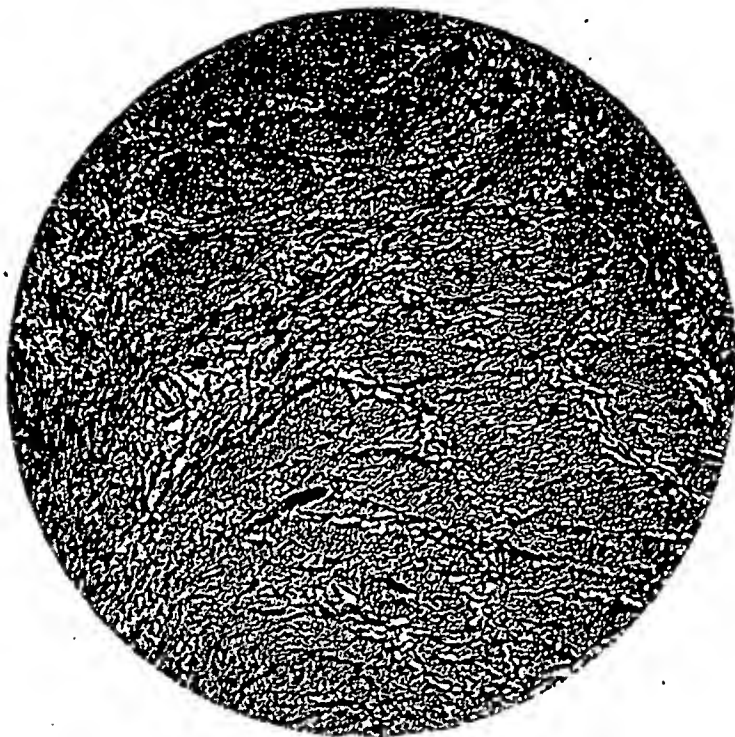


Fig. 11.—Case 7. Infiltration of fibrous carcinoma into muscular layer of stomach. Note small groups containing only few epithelial cells.

ulcerations. Smaller ulcerations also occurred in other areas of stomach. Both ovaries (Fig. 10) were uniformly enlarged, left 4.5 cm. long, 3 cm. wide and 2 cm. thick, surfaces smooth with but few depressions. On the cut surface the structure of the ovaries had largely disappeared. There were greyish red basal areas in which were white areas the size of lentils and peas. Both tubes perfectly free, thin and no fimbriae. Uterus firm and in its wall could be observed thin white tracts.

*Diagnosis.*—Scirrhus carcinoma of the stomach with propagation to the esophagus. Lymphangitis cancerosa of the mesentery. Metastases of the ovaries, liver and bones (ribs and lumbar vertebrae), cachectic anemia.

*Histologic Examination.*—All layers of the stomach wall were infiltrated by small groups of round epithelial cells (Fig. 11). Between these groups fibrous connective tissue was formed. Superficial layers of stomach mucosa gave no nuclear stain.

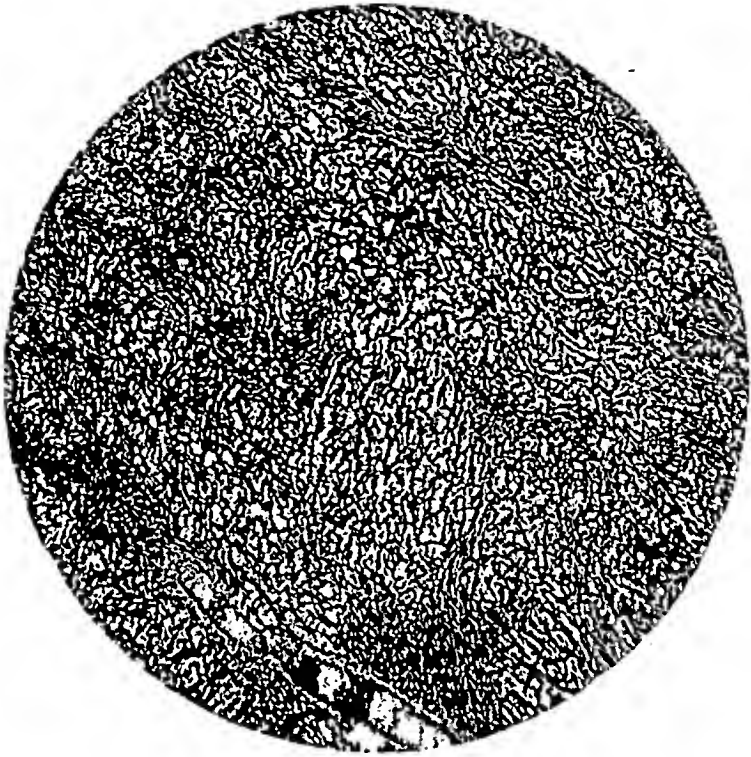


Fig. 12.—Case 7. Histologic structure of ovaries similar to structure found in stomach. Fibrous carcinoma without mucinous changes.

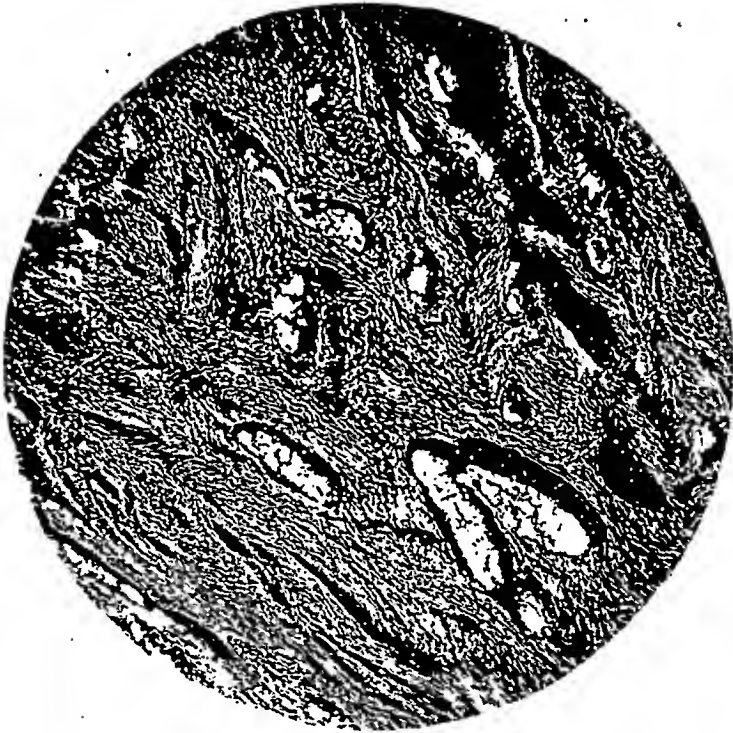


Fig. 13.—Case 7. Carcinomatous infiltration of muscular layer of uterus. Note groups of epithelial cells crowded between muscle fibers.

Mucinous degeneration not to be found. In the superficial layers of the ovaries only fibrous connective tissue was to be seen; under that smaller groups of epithelial cells appeared, between which the connective tissue was of fibrous character (Fig. 12). The mucinous degeneration of the epithelial cells was not well expressed. In some places the connective tissue presented myxomatous degeneration. In uterus under mucous membrane and also in mucous-membrane the lymphatics were filled by epithelial cells (Fig. 13), but the cells there did not present mucinous degeneration. A carcinomatous infiltration was found between the muscle fibers of the urinary bladder. This followed often along the course of the blood vessel lymphatics (Fig. 14).

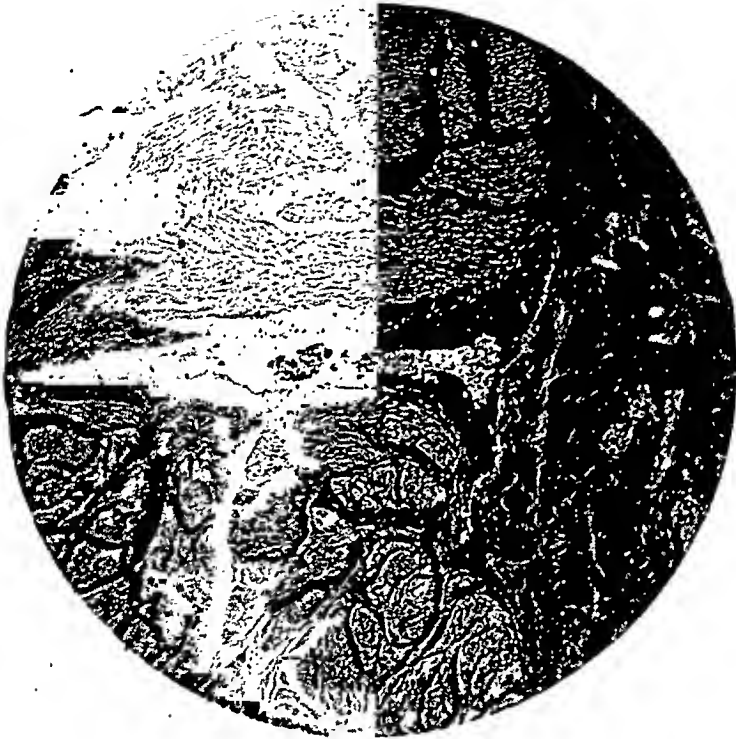


Fig. 14.—Case 7. Carcinoma cells filling lymphatic vessels in wall of bladder.

#### DISCUSSION OF MATERIAL AND DEDUCTIONS

In this series of seven cases, three patients were operated upon for tumors of the adnexa, the material removed showing structures of metastatic ovarian tumors. In two of these three, autopsy revealed gastric carcinoma; in the third instance further investigation was impossible because the patient was lost sight of. In the four remaining cases ovarian tumors were first recognized at the autopsy. Although most of the cases were advanced, yet the six autopsies contributed much evidence pertinent to the diagnosis. In all six primary carcinoma was found in the stomach; in four this finding was corroborated histologically. Three of the gastric carcinomas consisted of solid groups of epithelial cells, some with mucinous changes. One carcinoma (Case 7, Fig. 11) was fibrous and showed no mucinous transformation.



The ovaries in all cases presented typical uniform enlargement with preservation of the regular ovarian shape and indentations like the scars of a normally functioning ovary. The cut surface was generally solid except for a few discrete cysts. The solid tissue in some areas appeared gelatinous, grossly. Histologically the ovarian tumors in general presented the familiar Krukenberg structure, signet-ring cells arranged loosely or compactly between connective tissue rich in spindle-shaped cells. Two of the ovarian tumors presented irregular gland-like structures resembling adenocarcinoma, but in transition with groups of signet-ring cells.

In one instance (Case 6) the gastric carcinoma contained solid masses of round cells in partial mucinous degeneration, the stomach being free from adenocarcinomatous structure, but in the ovaries groups of mucinous cells occurred on the side of atypical glands. L. Gleize-Rambal and J. P. Robert<sup>26</sup> on the basis of similar observations, conclude that the tumor is of gastrointestinal origin, but we regard this evidence as not strong enough in itself to support the inference drawn. In Case 7 the histologic structure of the stomach was that of a fibrous carcinoma without mucinous transformation. These observations show that metastatic ovarian tumors presenting the gross appearance of the Krukenberg tumor may contain glandular structures like adenocarcinoma and that mucinous degeneration may be absent. The groups of epithelial cells can often be differentiated from the ovarian stroma except in certain cases when even the type of epithelial cells in the stomach cannot be established. Ewing<sup>27</sup> suggests that epithelial cells may be transformed into spindle-shaped cells.

The means by which tumor cells reach the ovaries has long been debated. One possibility, suggested by Bucher, is implantation. According to Frankenthal this way is most common if the gastric carcinoma already reaches the serosa. The carcinoma of the abdominal organs grows on the peritoneum and the desquamated or separating tumor cells sedimentate or are moved or propelled by intestinal peristalsis toward the ovaries, where they settle, after which penetration occurs. This theory is based in part on the work of Kraus<sup>28</sup> who discovered that India ink injected into the peritoneal cavities of rabbits appeared within three days in the ovarian substance. He concluded that the ink was taken up by wandering cells which pass through the germinal epithelium. Polano<sup>29</sup> affirms and Wolfheim<sup>30</sup> denies that corpuscular elements may pass through uninjured germinal epithelium. In Wolfheim's opinion the injected ink entered the lymphatics of the ovarian hilus and was taken up by cells. If the germinal epithelium is injured or if follicles are ruptured corpuscular elements may enter the ovarian substance. Kraus saw five cases of penetration of tumor cells from the ovarian surface into the substance. Müller,<sup>31</sup> Schlagenhauser, Papaioanou<sup>32</sup> and Kohlmann<sup>33</sup> be-



lieve that ovarian carcinoma in cases of Krukenberg tumors result from implantation.

A second possibility is that cancer cells are carried to the ovaries in the blood. Ribbert<sup>34</sup> believes this to be the case with metastatic ovarian carcinoma. Kaufmann<sup>35</sup> in carcinoma of breast and of thyroid and Chiari<sup>36</sup> in carcinoma of the breast found accompanying ovarian carcinoma; in these instances transmission can have been performed by the blood only.

A third possibility is propagation of carcinoma to the ovary through the lymphatics. According to Kehrer, cited by Amann<sup>37</sup> a retrograde lymphatic communication exists between the stomach and ovaries; on this the cancer cells may proceed.

In our cases the ovarian surface was examined in several blocks. In no case could we recognize deposits of tumors in the surface layer, which usually presented fibrous connective tissue, the tumor being present only in the deeper part of the ovaries. In two of our patients despite carcinosis of the peritoneum the ovarian surface was free from tumor. In our cases it was inconceivable that the tumor cells reached the ovarian substance through implantation. We could follow the propagation of the carcinomas by way of the lymphatics. Metastases occurred in the lymphatic glands and lymphangitis carcinosa was observed. Therefore it seems to us that in the formation of ovarian tumors propagation through the lymphatics plays an important part, propagation along the blood vessels and implantation being distinctly less important.

How are these processes related in time? Would it be possible to prove from our observations the statement of Schauta that after gastric carcinoma, metastases are formed earliest in the internal genital organs? Since in our cases it was propagation along the lymphatic vessels that was most important, we must consider how tumor cells could travel along the lymphatic vessels and reach the ovaries. The tumor cells must suffer at least two interruptions in their course, first in the retrogastric lymphatic glands, then in the superior lumbar lymph glands. It is of no moment whether the tumor cells grow along the lymphatic vessels producing lymphangitis carcinosa or are carried by the lymphatic stream; it is hardly possible for them to pass without affecting at least two sets of opposing lymph glands, especially since the travel of the cell is retrograde. For this reason we can hardly believe that gastric carcinoma could give rise to metastases in the internal genital organs without affecting the lymph glands. It is more probable that at the time of ovarian infiltration the retrogastric and superior lumbar lymph glands are already carcinomatous. The examination of early cases would be necessary to decide this definitely. Friedrich Krukenberg was the first who observed the infiltration by carcinoma of the fallopian tubes in the case of metastatic

ovarian carcinoma. The frequency of this occurrence, as was said above, has been examined by O. Frankl. The crux of the matter lies here: what is the significance of infiltration of the tubes and uterus and how should it influence our procedure? Should one accept Frankl's recommendation of total extirpation for Krukenberg tumor in order that uterine carcinomatous lymphangitis may not be left behind? Parallel conditions are afforded by our own cases where carcinomatous infiltration had occurred in three instances in the tubes, in one instance in the vagina, and in three instances in the uterus. In all cases where the uterine wall showed carcinomatous infiltration similar infiltration occurred between the muscle fibers of the urinary bladder.

It would appear from the observation of our cases that total extirpation of the uterus would be justified only if carcinomatous lymphangitis occurred earlier in the uterus than in the other organs; i.e., if the supposition of Schauta were true and the internal genital organs (ovaries, tubes and uterus) possessed selectivity toward metastatic formation. Infiltration of the bladder follows simultaneously with infiltration of the uterus. Frankl described the hardening of the uterus as the result of carcinomatous infiltration. The same is true of the bladder; it shrinks and becomes hard. On the other hand the carcinomatous infiltration of the tubes, uterus and bladder is similar to the carcinomatous lymphangitis found elsewhere in the organism; e.g., in mesentery, pleura, or lungs. From the original gastric carcinoma metastases are formed in several places and probably certain local conditions which are the result of rich blood and lymphatic supply or hormonal influences cause greater growth of the carcinoma in the ovaries than in other organs.

In carcinomatous cases if metastases are formed the prognosis is bad. The same is true of Krukenberg tumors, except for the less frequent primary Krukenberg type. It is in our opinion hardly justifiable to remove the carcinomatous organs while at the same time other organs are also affected. Advanced carcinoma should be treated in that way only if with therapeutic measures we could reach the carcinoma as it propagates in the circulation or tissue spaces. This cannot as yet be done by surgical means, or, according to our present experience, by the roentgen rays. The future has yet to show how cures may be effected. We must try to recognize the carcinoma early and remove it by operation before ovarian metastasis has occurred, since when the ovaries have been reached, the lymphatics and perhaps other organs are already beyond surgical or roentgen assistance.

#### SUMMARY

Seven cases of Krukenberg tumors were studied, of which six followed gastric carcinoma, as proved by autopsy; in the seventh case origin of the tumor could not be determined. All cases presented

typical gross appearance; the microscope showed ovarian adenocarcinoma together with mucinous cells in two cases, in one case carcinoma fibrosum produced ovarian enlargement without mucinous degeneration. Evidence was collected of propagation of gastric carcinoma through retrograde retroperitoneal lymphatic means. It is improbable that ovaries are the first place of metastatic formation in cases of gastrointestinal carcinoma, nor do the uterus and appendages possess selectivity, since at the time of affection of the uterus infiltration is also to be observed in the bladder wall. Carcinomatous lymphangitis of the uterus, tubes and urinary bladder must be grouped with metastases of other organs. Removal of genital organs in cases of Krukenberg tumor should be looked upon as a palliative measure only, since at the time of these tumor formations the affection is too far advanced and is beyond possibility of radical cure.

303 WEST ONE HUNDRED AND SIXTH STREET.

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## PREGNANCY FOLLOWING INVERSION OF THE UTERUS\*

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A NUMBER of observers have been interested in inversion of the uterus in recent years. This is evidenced by the amount of literature appearing on the subject from time to time. To my knowledge, however, none has taken up the subject from the subsequent pregnancy point of view. A recent case of this nature in the Obstetrical and Gynecological Clinic at the University of Michigan stimulated the writer to make an investigation of this subject, particularly from the standpoint of subsequent pregnancies.

In all, fifty-six cases were studied. This number includes the author's and fifty-five cases collected from available literature, and it would seem to be a fairly complete tabulation, since all possible leads or clues were followed in the search of records mentioning subsequent pregnancies. Fifty-five cases from such an enormous literature on inversion as the world presents today seem hardly correct. Certainly thousands of inversions have occurred and many of these women must have conceived later. Undoubtedly, they have gone unrecorded in the literature as is the way with many other interesting conditions.

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The case reported here is that of a young woman, aged twenty-three. She was admitted to the Department of Obstetrics and Gynecology, University Hospital, on October 11, 1924. Her first baby was born in March, 1924. The confinement was entirely normal except for the third stage. Some difficulty was encountered in delivering the placenta, following which a complete inversion of the uterus occurred. The patient stated that she bled very profusely and that her condition was considered extremely serious for several days. As she gradually improved she noticed there was a continuous bloody discharge, generally slight in amount, but occasionally quite profuse. This, with persistent dragging sensation in the pelvis associated with frequent headaches, was her only complaint on admission.

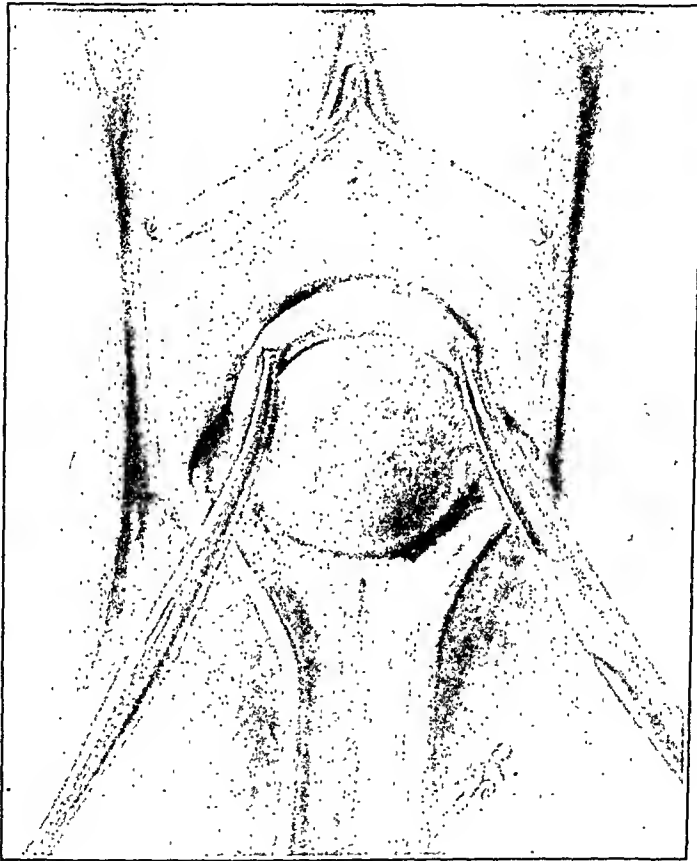


Fig. 1.

Examination showed a distinct round mass about the size of a duck's egg protruding through the cervical rim. The fundus could not be felt in the normal location. History and examination made the diagnosis obvious.

On October 17, 1924, the lesion was corrected by a slightly modified Spinelli operation, the steps of which are here briefly outlined. The upper cervical lip was grasped about one-half inch on either side of the midline with a volsellum forceps (Fig. 1), and a transverse incision about one inch in length made through the vaginal mucosa and fascia just below the bladder reflection. A sound in the bladder helped considerably in locating the desired point (Fig. 2). The bladder was then separated from the uterus by blunt dissection (Fig. 3), and the peritoneal cavity opened (Fig. 4). The appendages and the entire anterior wall of the uterus were then palpated by the examining finger (Fig. 5). An incision was next made

through the entire anterior cervical and uterine walls down to the top of the fundus (Fig. 6) and the uterus inverted by using the thumb and index finger of each hand (Fig. 7). The next step, an important one, was to remove a wedge or slice of uterine wall from each side of the incision. The inner or endometrial surface of the removed slice was fairly thick. This was done to permit better approximation of the uterine wound (Fig. 8). The uterine incision was closed by using interrupted chromic No. 1 catgut sutures, each suture going down to, but not through the endometrium (Fig. 9). The serous edges were then approximated with interrupted mattress sutures of the same material (Fig. 10). In order to take up some of the slack in the round ligaments, these structures were pleated upon the anterior surface of the uterus (Fig. 11). The repaired uterus was then pushed

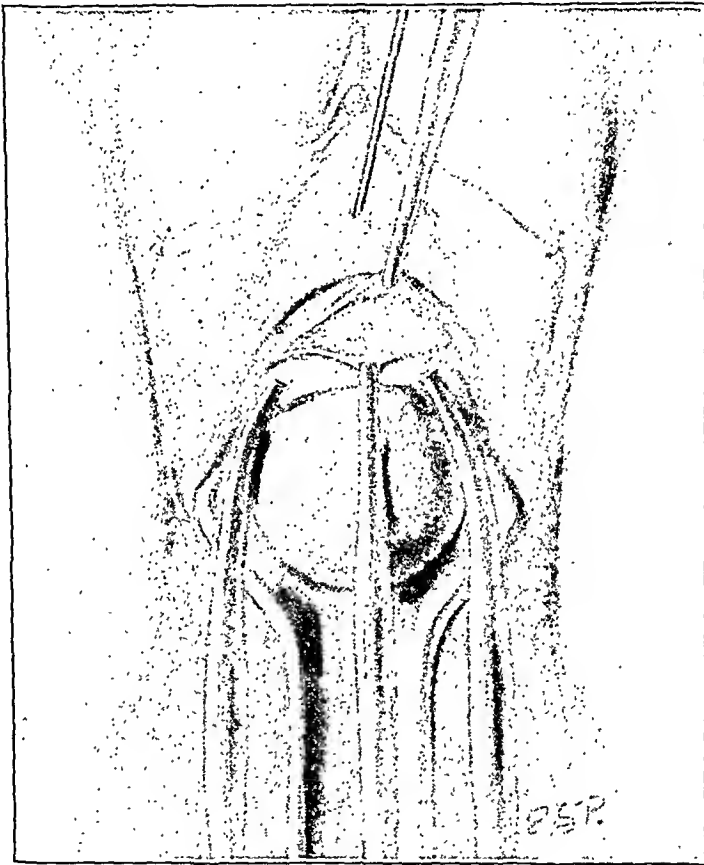


Fig. 2.

back into the pelvis and the peritoneal edges approximated (Fig. 12). The edges of the vaginal mucosa were then united from side to side (Fig. 13) in order to prevent foreshortening of the anterior vaginal wall.

The patient's convalescence was uneventful and she was discharged from the hospital two weeks later.

On several occasions during the next year the patient was re-examined and on September 28, 1925 she was readmitted to the clinic for confinement. On October 8, 1925 a normal male child weighing a little over six pounds was born. The labor was carefully watched and was perfectly normal in every respect, lasting only five and one-half hours. Examination of the cervix and uterus immediately following confinement revealed no evidence of the former operation. There was no abnormal condition of the anterior uterine wall noted; no cicatrix or abnormally thin

area could be found. Reexamination two weeks later revealed nothing abnormal or unusual. The puerperium was uneventful in every respect and the patient was discharged at the end of two weeks.

A study of the data obtained from this and reported cases revealed sufficient evidence to warrant several important deductions.

*Etiology of Inversions.*—I was particularly interested in noting whether any operative delivery or procedure preceded the inversion. Unfortunately, very meager information was available on this subject. In one instance a coil of cord around the baby's neck was reported,

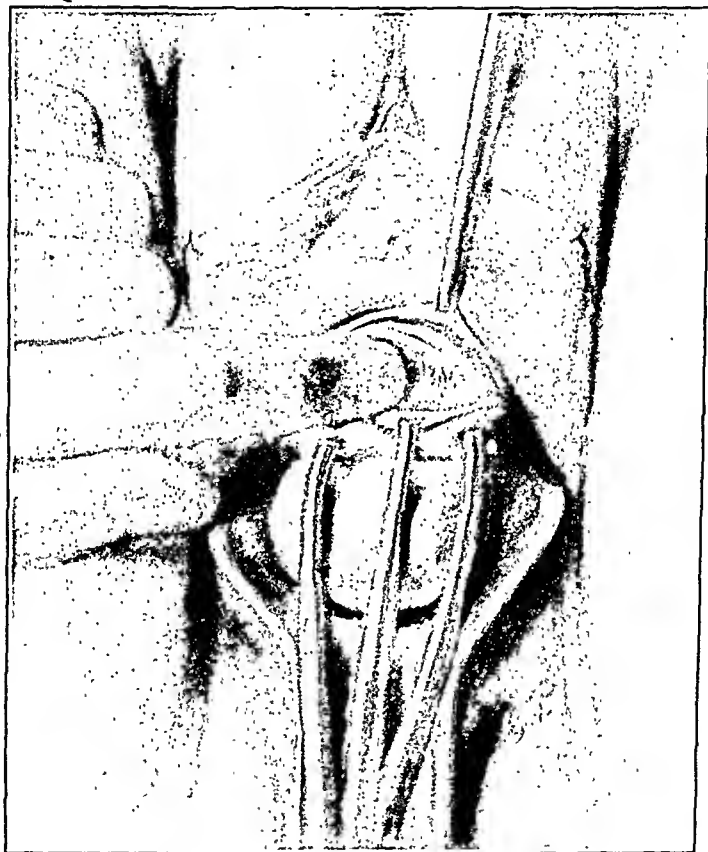


Fig. 3.

Sweeney.<sup>45</sup> In two cases, Valdez<sup>50</sup> and Corruthers,<sup>6</sup> the inversion followed forceps delivery. Were the data available, it would be interesting to note the rôle played by the various methods of operative delivery, and more particularly by manipulations in the third stage of labor. Such procedures as traction on the cord, Credé expression of the placenta undoubtedly played an important part in the etiology, but probably the factor most responsible was the congenital weakness of the uterus, stressed by many writers on the subject.

All of the fifty-six cases reported became pregnant once or oftener after the original inversion. Exact information as to the number of pregnancies following inversion will, obviously, never be available.

It is doubtful whether the small number of reported cases is a fair indication as to the actual frequency of subsequent pregnancies following inversion. If correct, however, it may be explained partly by the advice given by the attending physician regarding dangers of future pregnancies. It is conceivable that these dangers may have been very greatly stressed in those cases where the correction was by operative means. Just how prominent cesarean section has been in the treatment of these cases during subsequent pregnancies is un-

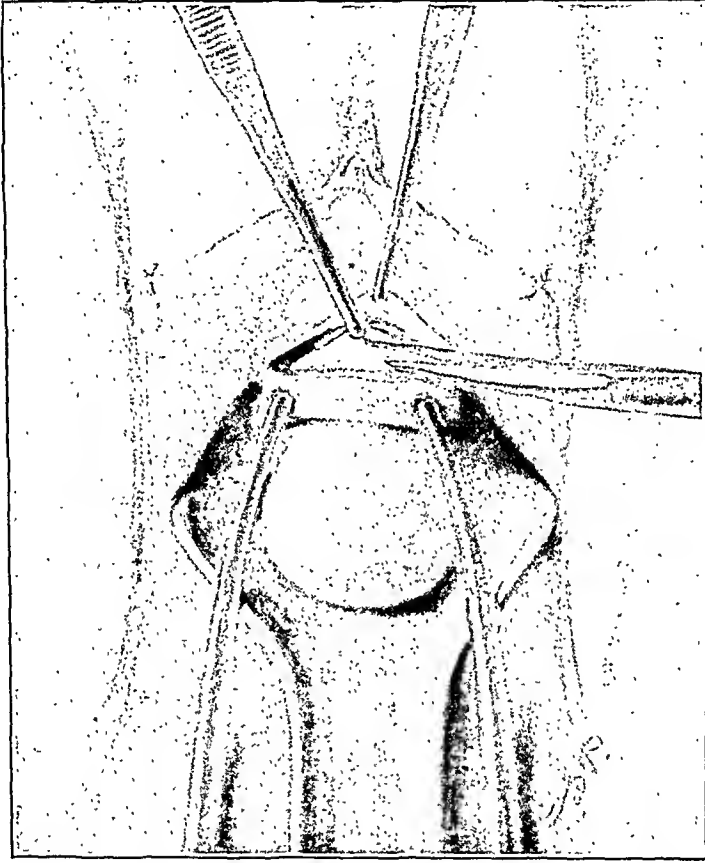


Fig. 4.

known. Possibly cases delivered by this method have been considered unimportant and therefore unrecorded.

*Age.*—Of the fifty-six cases studied, the youngest recorded was a patient eighteen years of age. This case was reported by Dahlgren.<sup>8</sup> The original inversion existed six weeks before it was repaired by Piccoli's incision. Two subsequent pregnancies occurred. Both terminated normally. The oldest case in this group, reported by Heinrich,<sup>16</sup> was a woman aged thirty-seven. The inversion was of eleven months standing. It was also repaired by Piccoli's incision. One child was born nine years and nine months later. The confinement was normal.



*Parity.*—In this group there were sixteen recorded as primiparae; twenty-one multiparae and in nineteen the parity was not stated. In the group of multiparae there were eleven para-ii, three para-iii, four para-iv, one para-vi, one para-xi, and one simply recorded as a multipara. The slight preponderance of the multiparae over primiparae would tend to bear out many of the existing opinions on the greater incidence of inversion among multiparae. The difference is not sufficient, however, to warrant any conclusion other than that already mentioned.

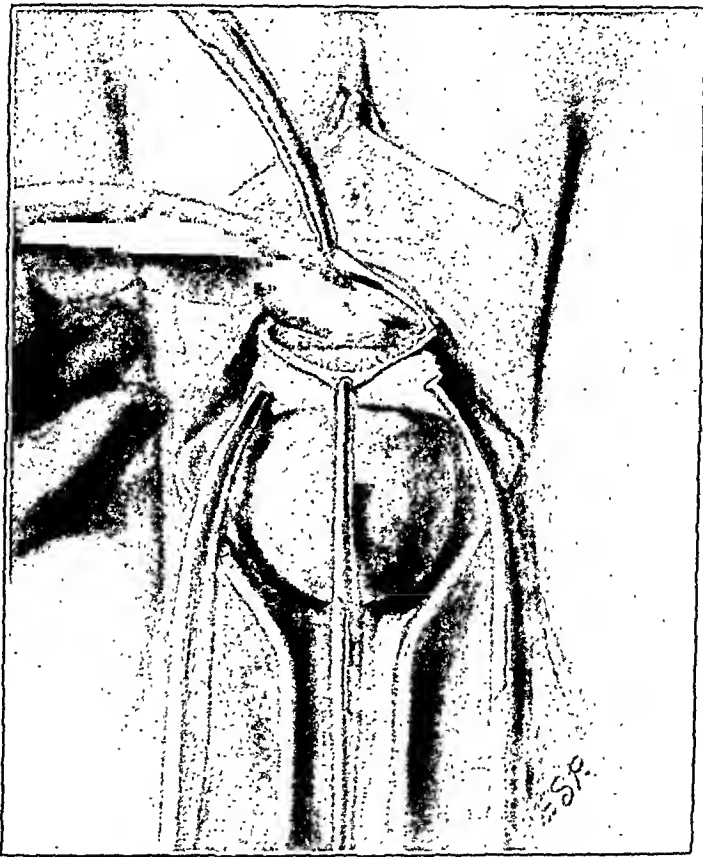


Fig. 5.

*Duration of Inversion before Correction.*—In the group of cases corrected manually, the average duration of the inversion was approximately thirty-three days. It must be stated, however, that fifteen of this group were corrected immediately. The longest interval in this group was twelve months. This case reported by Sims had a spontaneous inversion of the uterus some time after confinement. It existed about twelve months before it was corrected manually. In not all instances where manual correction was employed was the duration of the lesion mentioned. Were it not for two cases, the one of the twelve months' duration, Sims,<sup>42</sup> and one of seven months' duration, Emmet,<sup>10</sup> the average length of time in this group would be ten days,

which is a much more reasonable figure. It might well be assumed that the actual number of manual replacements is considerably less as the duration of the lesion lengthens. Manual reduction becomes proportionately more difficult as the lesion continues and involution with contraction of the cervix may render manual reduction entirely impossible.

In the group undergoing spontaneous correction we found the average duration was, curiously enough, nine hundred and sixty-nine days or thirty-two months. A further interesting fact in this group was

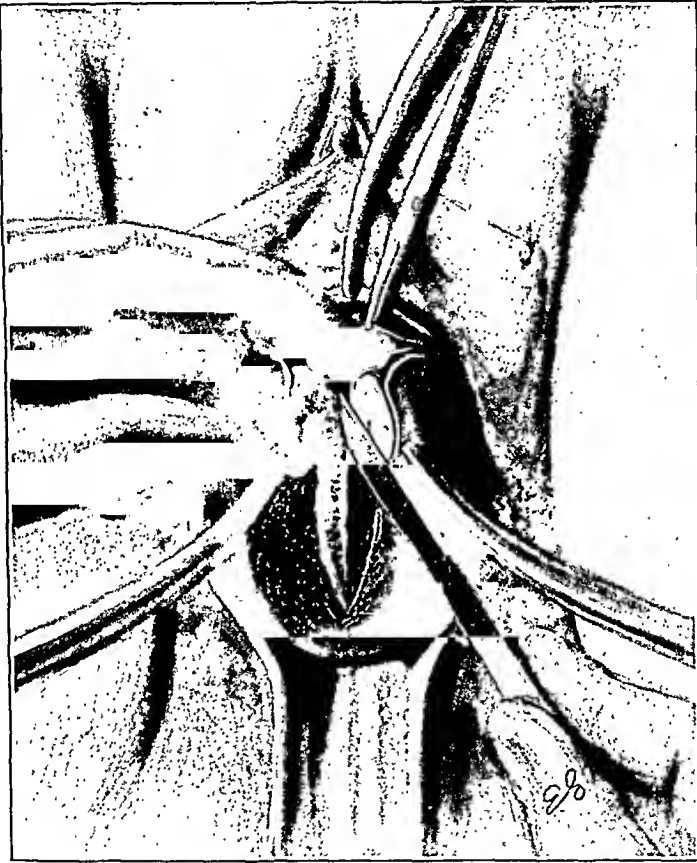


Fig. 6.

that several of these spontaneous replacements occurred after other methods had been tried. Thus, four occurred after numerous unsuccessful attempts at manual reduction had been made, McCullagh,<sup>26</sup> Meigs,<sup>34</sup> Stevens,<sup>44</sup> Tyler-Smith.<sup>49</sup> One case underwent spontaneous reduction after Aveling's repositor had been used in vain, McCullagh.<sup>26</sup> The explanation of this rather unexpected finding is not entirely clear. Possibly attempts at reinversion were made while the uterus was still markedly congested and edematous, and later as involution slowly occurred and the edema disappeared, nature was able to repair the lesion without assistance. Certainly, it reveals the ever-

present tendency on the part of nature to maintain constantly or bring about the normal.

In the group corrected by operation, numbering twenty-two, the average time or duration of the lesion previous to correction was two hundred and seventy days or nine months. The longest duration in any one case in this group was five years (Born<sup>2</sup>) and the shortest, four days (Walponer<sup>51</sup>). Quite a wide variety of operative methods were recorded—some more simple than others,—and it seems that the choice of operative procedure must depend on the indi-

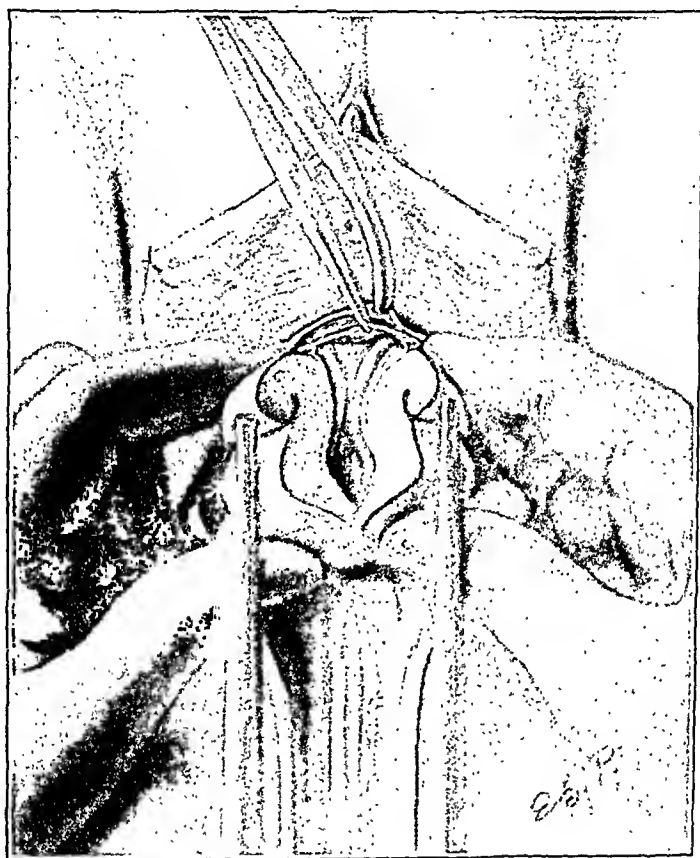


Fig. 7.

vidual case and on the operator's idiosyncrasies. It is apparent that some inversions are easily corrected and require little in the way of operative work, while others are more difficult and naturally will require considerably more in the way of surgical procedure. It would appear desirable, however, that more effort be made to standardize the operative treatment, for it is only by so doing that best results can be obtained.

*Methods of Correction.*—Of the fifty-six cases studied, in only fifty-five was the method used in correcting the inversion recorded. In these fifty-five, twenty-five were replaced manually. One of these, however, had the help of an air pessary, Tyler-Smith,<sup>49</sup> and another

the aid offered by astringent douches, Sweeney.<sup>45</sup> Eight cases were spontaneous in their replacement. One of these followed an attempt at replacement by means of Aveling's repositor, McCullagh.<sup>27</sup> There were twenty-two operative corrections. Of this number eight were corrected by Piecoli's incision; two by the combined Piecoli-Borelius-Westermann method; five by the Spinelli operation; three by the Küstner operation; one by the Küstner-Borelius-Westermann operation; one each by the Kehrer's and Duret's method and one by the Aveling repositor.

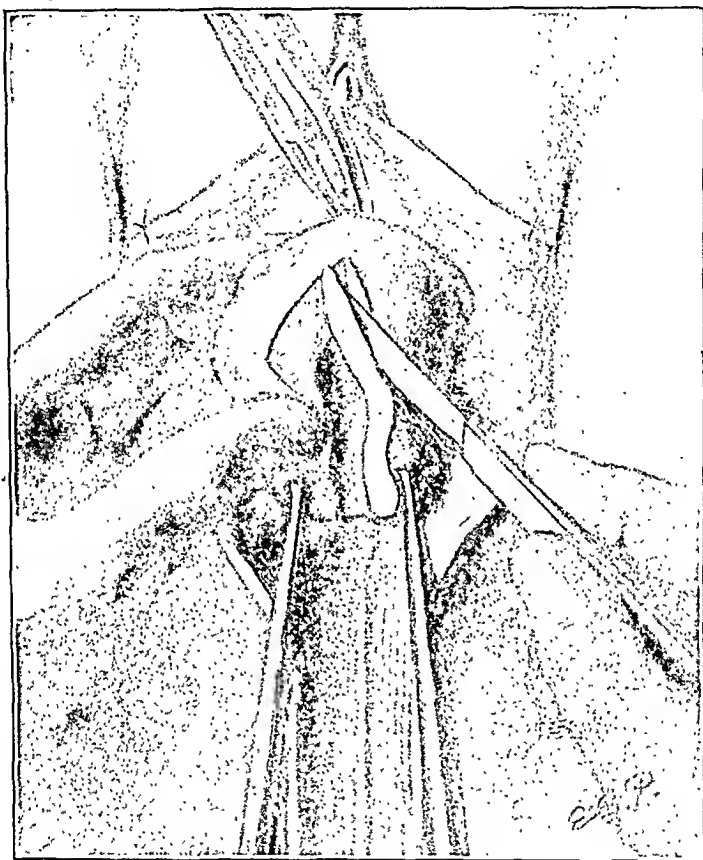


Fig. 8.

Those interested in the technic of these various operative procedures are referred to the very excellent articles on the subject by Dr. Reuben Peterson.<sup>56</sup>

*Subsequent Pregnancies.*—The greatest number of reported subsequent pregnancies following the original inversion in any one case was five. The patient, a woman of twenty-four, reported by Emmet,<sup>10</sup> had five normal pregnancies following the original inversion, without recurrence of the lesion. Very likely more than five pregnancies have occurred in women who have had an inversion, but none are recorded in the literature.

*Number of Recurrences with Subsequent Pregnancies.*—In eight cases where spontaneous cure occurred, two had a recurrence of the inversion with a subsequent pregnancy, Mayer,<sup>32</sup> and Stephens.<sup>43</sup> The first was corrected manually and the other underwent spontaneous reduction two months later after manual reduction had been attempted. Of those manually corrected, twenty-five in all, eleven, or 44 per cent, had a recurrence of the inversion with subsequent pregnancies, Corruthers,<sup>6</sup> Crosse,<sup>7</sup> Fritsch<sup>11</sup> (two cases), Furst,<sup>12</sup> Gilbert,<sup>13</sup> Huber,<sup>18</sup> Kuhlbrand,<sup>25</sup> Nijhoff,<sup>37</sup> Philips,<sup>38</sup> and Schönбек.<sup>40</sup> In the twenty-two cases cured by operation, not one recurrence was noted, a very note-



Fig. 9.

worthy fact when compared with the eleven recurrences in the group of twenty-five manually corrected cases. One other case of recurrence was reported, but the original method of correction was not mentioned. Valdez.<sup>50</sup> In all, there were fourteen recurrences, or approximately 33 per cent of all inversion cases recurred with subsequent pregnancies. In this study not one of the recurrences followed operative repair. Unless this is clearly understood, the frequency of recurrences (33 per cent) is apt to be very misleading.

*Abortions.*—Only three abortions were reported in the entire group of fifty-six cases. One occurred in an operative case corrected by

Duret's method, Beloustegui,<sup>3</sup> one in a spontaneously cured case, Meigs,<sup>34</sup> and the third in a case corrected by manual manipulation, Nijhoff.<sup>39</sup>

*Adherent Placenta in Subsequent Pregnancies.*—Sixteen of the forty-two cases, or 38 per cent, where puerperal complications were recorded, had an adherent placenta with the next confinement. Ten of this number occurred in the twenty-five manually corrected cases, Meigs<sup>33</sup> (two cases), Manton,<sup>30</sup> Philips,<sup>38</sup> Schönбек,<sup>40</sup> Kain,<sup>20</sup> Fürst,<sup>12</sup> Fritsch,<sup>11</sup> Corruthers,<sup>6</sup> Stephens,<sup>43</sup> Wilson.<sup>54</sup> Also once after each of

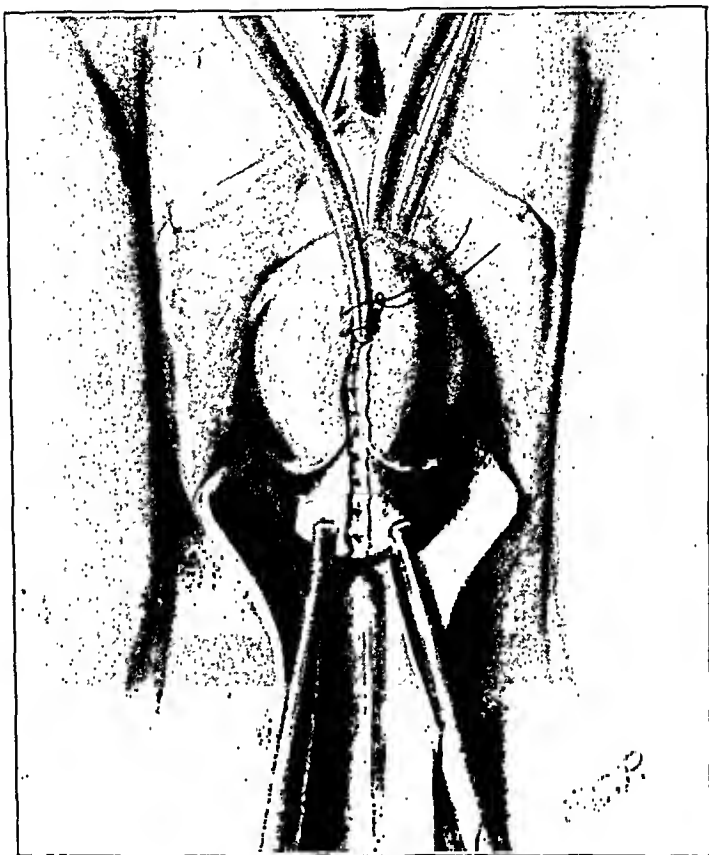


Fig. 10.

the following operations: Piccoli, Duret, Küstner and Piccoli-Borelius-Westermann. One adherent placenta occurred in the group of eight spontaneous corrections, Stephens,<sup>43</sup> and in one case the method of correction was not given, Valdez.<sup>59</sup> Again an interesting condition is revealed in that 40 per cent of all manually corrected cases are associated with an adherent placenta, while only 18 per cent of cases corrected by operation had a similar complication. The explanation is not easy, since one would expect at least as many predisposing factors present in operative cases as in those manually corrected. Low grade infection of the uterus probably accounts for many, and we might well expect even a greater frequency in the operative group

for that very reason. In the operative group there is the additional factor of the sear to be considered.

*Hemorrhage.*—Serious postpartum bleeding occurred in six out of forty-two cases, or 14 per cent; three times in manually corrected cases, Gilbert,<sup>13</sup> Nijhoff,<sup>37</sup> Schönbek;<sup>40</sup> twice in the operative group, Duret,<sup>9</sup> and Born;<sup>2</sup> and once in a spontaneously corrected case, Tyler-Smith.<sup>49</sup> With a percentage of 26 for recurrence, this would seem unusually low. Serious hemorrhage probably occurred in most cases of recurrence as well as in some of the sixteen with adherent placenta.

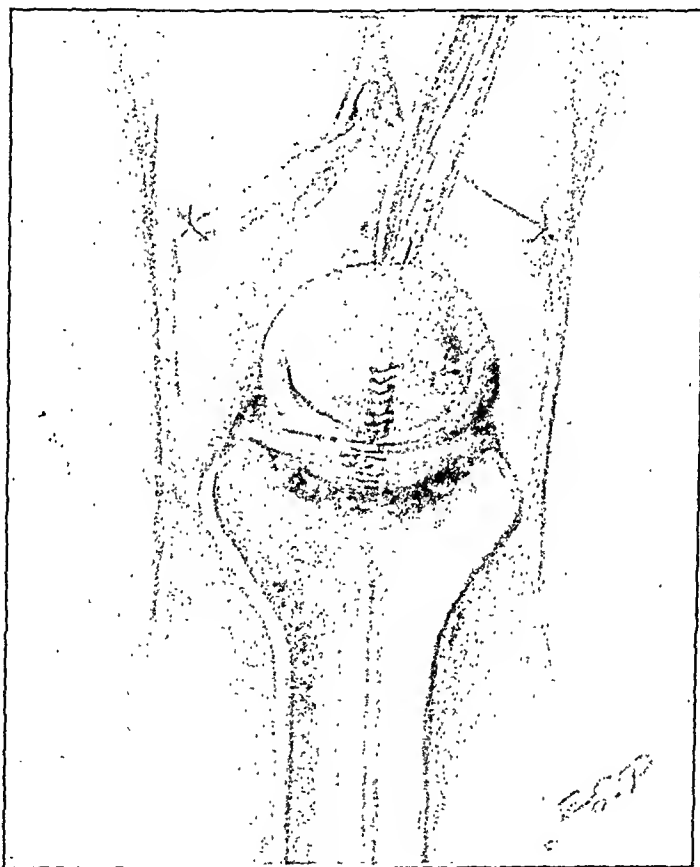


Fig. 11.

Probably the above mentioned figure does not correctly represent the frequency of this complication.

*Morbidity and Mortality.*—The end-results were strikingly good. Of the forty-two reports recording end-results only two cases of sepsis were noted, or 4.6 per cent. One of these died, Küstner,<sup>24</sup> the only death in the entire group (2.4 per cent). This death occurred four days after confinement. The patient had been cured of her original inversion by Küstner's incision three years previously. The other had a total inversion following labor three years after the original inversion, Huber.<sup>15</sup> Peritonitis and metritis followed but subsided eventually.

From the standpoint of morbidity and mortality, probably the most important and striking feature, outside of the low sepsis and mortality rate, is that not a single instance of ruptured uterus was recorded. In the entire group of twenty-three cases corrected by operative means (in one case the exact method was not given) at least twenty-nine confinements occurred and in not one did rupture occur. This is quite contrary to the present feeling regarding incision in the uterus and the subsequent dangers of rupture.

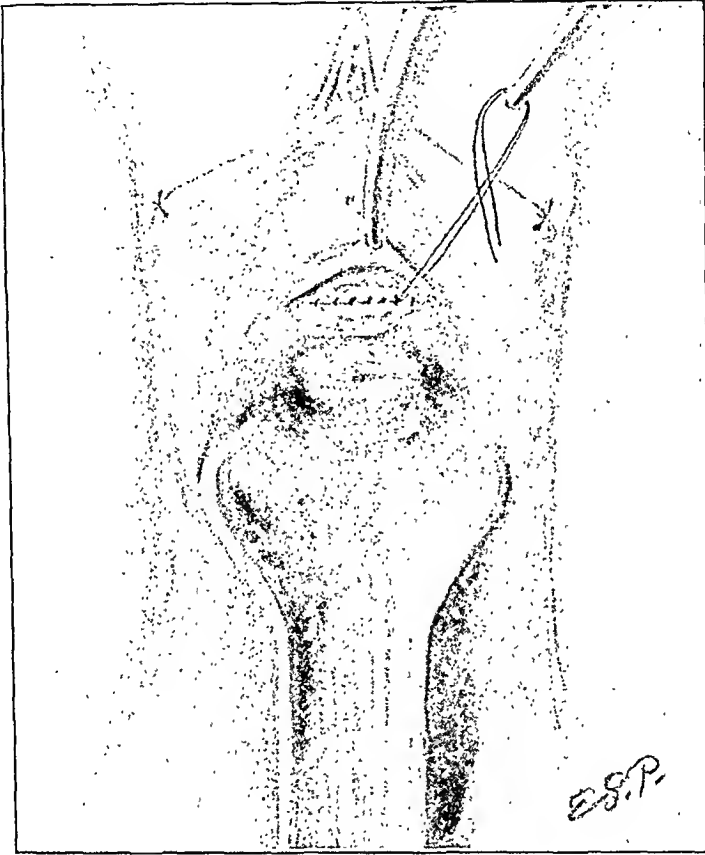


Fig. 12.

*Management of Pregnancies Following Inversion of the Uterus.*—It would appear from the information presented that conservative treatment with the hope of a normal confinement is the treatment of choice. Cases with a history of manual reduction of the inversion should be particularly watched for complications such as recurrence, adherent placenta and hemorrhage. Proper precautions by preparing for any of these emergencies should be taken. Curiously enough, where a history of operative correction is given, an uncomplicated confinement may, as a rule, be anticipated. While the possibility of rupture of the uterus must be considered, the chances of its occurring are probably slight. The dangers from this source in cases with a history of operative repair are probably greatly exaggerated. The necessity of advis-



ing cesarean section for subsequent pregnancies in this type of case would appear slight. In fact, the evidence is entirely in favor of a normal confinement in the operative group. In either instance, the facilities of a well established maternity should be available. To confine such a patient in the home when the best facilities are now within the reach of people in all walks of life, would, indeed, be seeking trouble.

It would seem desirable to discuss here the methods of correcting the original inversion. It is only by study of these methods and the

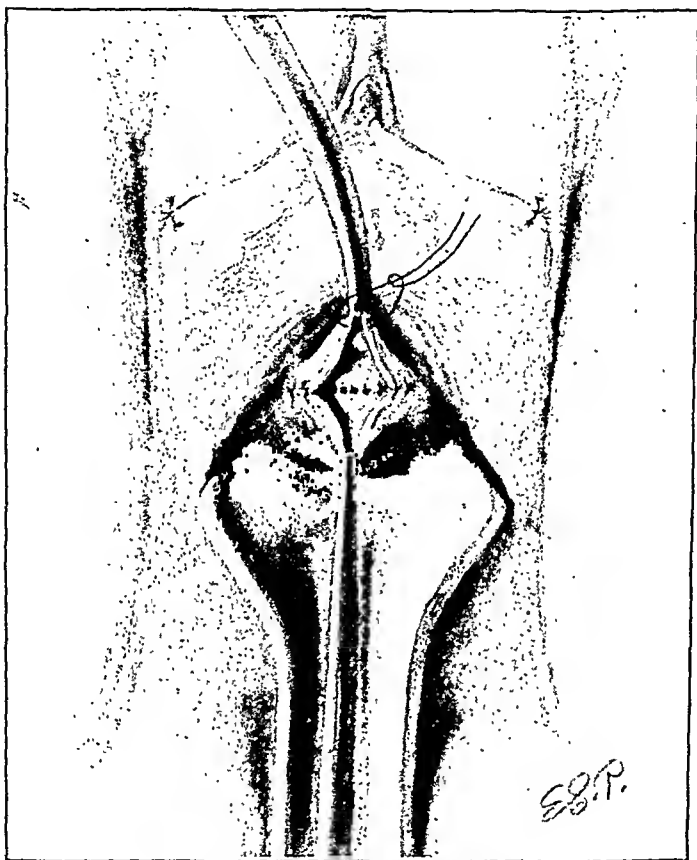


Fig. 13.

results obtained that the best method of correcting the lesion can be determined.

The methods of treatment in the past have been quite numerous and include all types of operative repair as well as manual reduction. In spite of the many types of operative correction, the end-results in this group are far better than those of the manually reduced group. This is particularly surprising when we consider the variety of operations used and that many of these must have been the first performed by the operator. It is conceivable that many minor defects could have been avoided had the operator had more experience in this type of case and were the operative methods standardized. In spite of the

above, however, all of the postpartum complications were more frequent in the manually treated or nonoperative than in the operative group. It seems that one of the best methods of repair is the Spinelli operation. In the group of five cases corrected by the Spinelli method not a single complication occurred with subsequent pregnancies, and yet one of this group had four subsequent pregnancies, one had two, and three had one each. Any attempt at comparison of the various operative procedures is obviously unfair, since so few cases have been repaired by any one method. Judging from available data, however, the Spinelli operation would appear to be the best.

While the results in cases corrected by operation are far superior in so far as future pregnancies are concerned, it is apparent that this procedure can never be the one of first choice. In acute cases, manual reduction will probably always be attempted first with the hope of relieving the condition as quickly as possible as well as to prevent the serious symptoms usually accompanying a chronic inversion. Where manual reduction is impossible, however, or where the patient is first seen with a chronic lesion, operative repair should be advised.

In reconsidering, it seems: (1) that recurrence of the inversion is more apt to occur in women of greater parity; (2) that quite a variety of methods are used in correcting inversion of the uterus and an attempt should be made to standardize the operative treatment; (3) that the Spinelli operation gives probably the best results of any operative procedure; (4) that the chance for recurrence of the lesion is approximately 44 per cent in cases corrected manually, while in cases corrected by operative means, the chances are very slight (not one case of recurrence was recorded in those originally corrected by operation in this group); (5) adherent placenta occurs frequently, being found in 18 per cent of all operative cases, 40 per cent of all manually corrected cases, or in 38 per cent of all cases; (6) serious postpartum hemorrhage is probably more frequent than the evidence would lead us to believe. It occurred in 14 per cent of all cases at the time of subsequent confinement; (7) sepsis does not occur as often as one would expect, resulting in only two cases in this group or in 4.6 per cent; (8) fatal termination occurred in one case or in 2.4 per cent; (9) the dangers of ruptured uterus in subsequent pregnancies where the original lesion was corrected by operative means is greatly exaggerated; (10) the treatment should be conservative, but measures should be taken to cope with any complication; (11) cesarean section in these cases seems unwarranted, but, if considered, is more applicable to those manually reduced than to the operative group.\*

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\*NOTE: Brief summaries of all of the cases analyzed in this report will be included in the author's reprints.

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# INTRAMURAL ABSCESS OF UTERUS, WITH REPORT OF A CASE

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THE writer has been prompted to elaborate briefly upon the condition herein described, because of the fact that a careful search through textbooks on gynecology and obstetrics shows little or no mention of the subject; furthermore, it is quite certain that intramural abscess of the puerperal uterus occurs with much greater frequency than the reported case and autopsy records would indicate.

Barrows<sup>1</sup> states as his belief that the explanation of this apparent oversight lies in the fact that the condition under discussion has been confused with other inflammatory disturbances of the pelvic organs, and has in this way escaped the attention which it deserves.

In the year 1901, von Franque<sup>2</sup> reviewed the subject of uterine abscess in an excellent monograph. He collected from the literature only fifteen authentic cases, of which seven were of puerperal origin. The article contains abstracts of all the authentic cases, also the doubtful ones. In 1906, Noble<sup>3</sup> reported four cases of abscess of the puerperal uterus, making eight in all which had occurred in his practice. He collected eleven others from the literature, which, with the eight, he arranged in tabulated form.

In 1907, Mereade<sup>4</sup> published a review of the literature of uterine abscess, in which he stated that from a very exhaustive study of the same, he succeeded in locating forty-one authentic cases, of which twenty-two were of puerperal origin.

Sampson<sup>5</sup> published a valuable contribution to the subject in a detailed report of the diagnosis and treatment of four cases of puerperal origin, occurring in his practice.

In 1911, Barrows<sup>1</sup> reported an excellent description of a series of seven cases, coming under his immediate observation.

Since the papers of Sampson and Barrows, I have been able to find only a few isolated cases reported. However, these two aforementioned groups have been considered of sufficient interest to warrant brief abstracts.

SAMPSON. CASE 1.—Intramural abscess (streptococcus) of the left uterine cornu resulting from puerperal infection following instrumental delivery, abscess incised and drained extraperitoneally—appendages normal. Recovery.

CASE 2.—Intramural abscess (streptococcus) of the right uterine cornu resulting from puerperal infection following normal delivery—abscess incised and drained transperitoneally. Recovery. Adnexa normal. Normal labor and puerperium, twenty months later.

CASE 3.—Multiple abscesses of the uterus, ovaries, bladder wall, and pelvic connective tissue—purulent pelvic peritonitis and thrombophlebitis—(streptococcus and

colon) resulting from puerperal infection following criminal abortion. Death on the twenty-third day. The author (Dr. Sampson) ventures as his opinion the statement that an early operation in this case, by which the pelvis could have been filled with gauze, and drained through the culdesac, would probably have offered the best chance for recovery.

CASE 4.—Multiple abscesses of the uterus, right ovary, and bladder wall, encapsulated purulent peritonitis (retention abscesses) and thrombophlebitis of the right ovarian veins (streptococcus) resulting from puerperal infection following manual delivery. First operation, multiple incisions and drainage,—as the patient did not improve after four weeks, but continued to run a septic temperature, a second operation was performed, supravaginal hysterectomy, bilateral salpingo-oophorectomy, ligation of right ovarian vessels at the pelvic brim, recovery.

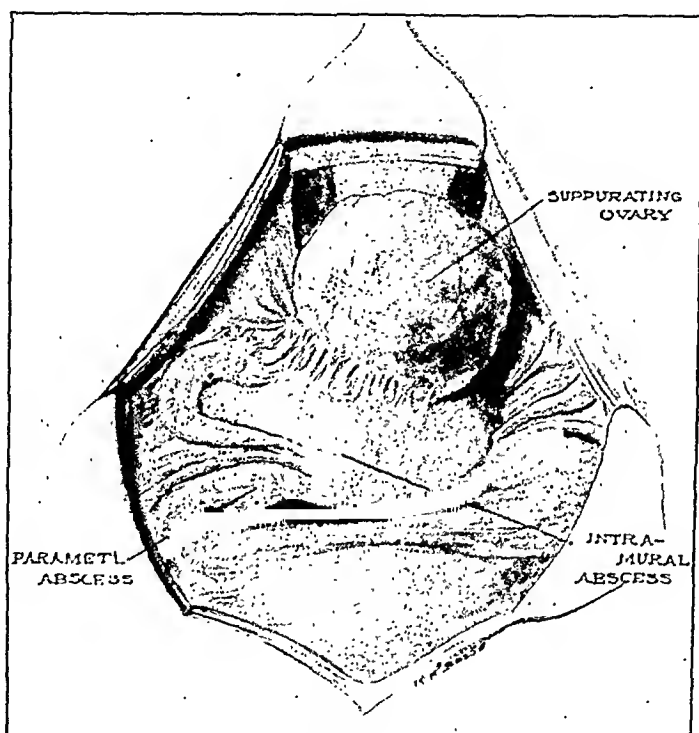


Fig. 1.—Posterior aspect of uterus, showing abscess formation in uterine wall, parametrium and ovary.

BARROWS. CASE 1.—Intramural abscess (streptococcus) near right uterine cornu following intrauterine operation (exact nature unknown) two weeks after normal labor. Incision, transperitoneal, suprapubic drainage, recovery.

CASE 2.—Intramural abscess (streptococcus) at right uterine cornu, six weeks after normal delivery. Incision, transperitoneal, suprapubic drainage, recovery.

CASE 3.—Puerperal (streptococcus) intramural abscess in left upper anterior portion of uterine wall, dissecting anteriorly between the folds of the broad ligament to pelvic wall. Incision, drainage, recovery.

CASE 4.—Puerperal abscess of anterior uterine wall (streptococcus) dissecting between uterus and bladder. Anterior colpotomy, vaginal drainage, recovery.

CASE 5.—Intramural abscess of uterus (streptococcus) the result of puerperal infection \* \* \* Incision, drainage, treatment by autogenous streptococcus vaccines. Recovery.

CASE 6.—Abscess of the uterus, puerperal (streptococcus). Treatment by incision and drainage, autogenous and antistreptococcus vaccines. Recovery.

CASE 7.—Intramural uterine abscess (gonococcus). Treatment by incision and drainage, antigenococcus vaccine. Recovery.

As regards treatment, the consensus of opinion of those who have written upon the subject favors surgical drainage, the same to be held in abeyance until after the acute inflammatory symptoms have subsided, preferably by the abdominal, occasionally by the vaginal, route. Where multiple abscesses are present, or even one abscess with extensive involvement, hysterectomy is indicated. In selected cases, after the



Fig. 2.—Showing ovary partially separated.

abdomen has been opened, the abscess may be drained through the uterine cavity, or extraperitoneally through the layers of the broad ligament.

*Case Report.*—Mrs. M. D., admitted to gynecologic service, United Israel Zion Hospital, Dec. 22, 1925, thirty-eight years of age, married fifteen years, para vii, youngest child 10 months, one miscarriage, six years ago, no curettage.

*Menstrual history:* Began at fifteen, regular, twenty-eight day type, six days duration, no dysmenorrhea, moderate flow. Last period, Oct. 15, 1925. Did not menstruate in November. After waiting a few days, she began taking hot baths and some "medicine." On December 5, three weeks later, she began to bleed rather profusely, passed some clots, and had abdominal cramps. The bleeding lasted four days, then ceased entirely, until three days before admission. She used lysol douches

occasionally, in the interim, and took some more "medicine." During this entire period, she suffered from severe pain in the right flank, radiating anteriorly to the right lower quadrant; morning nausea had been present since October 15. On December 26, three days before admission, patient began to bleed again, following a lysol douche. This was accompanied by chilly sensations and some fever. At no time was there any attack of syncope, or sudden sharp pain in the abdomen. (After the patient had been in the hospital several days, she finally admitted that a criminal abortion had been performed upon her eight days before admission.)

Chief complaint: Vaginal bleeding; pain in right lower quadrant. Examination revealed an adult female patient lying quietly in bed, apparently not in severe pain. General physical examination, negative. Abdomen slightly distended. Liver and

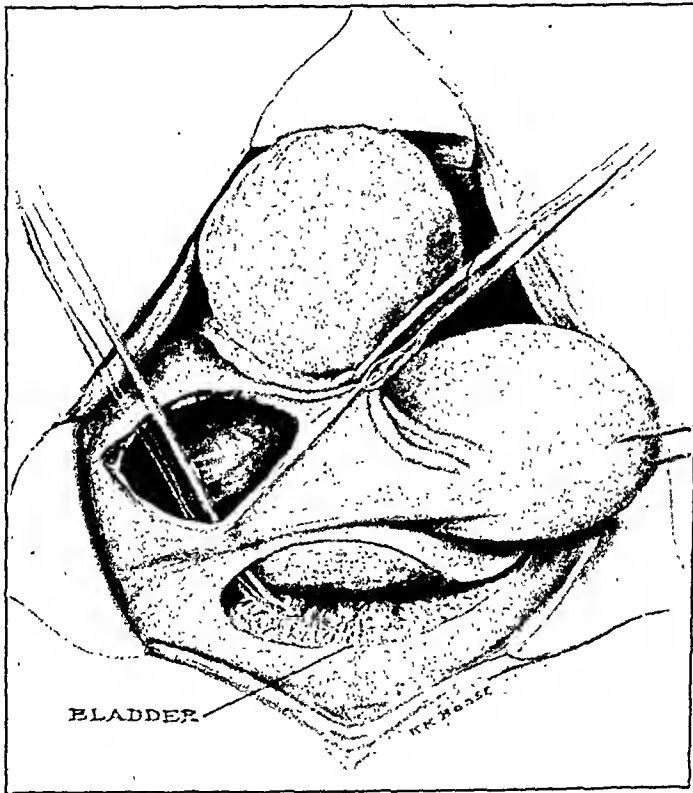


Fig. 3.—Operative procedure, right infundibulopelvic ligament divided, parametrial fossa exposed, bladder separated downward, extreme vascularity of bladder wall indicated.

spleen not palpated. Slight tenderness elicited in both lower quadrants and above symphysis. No rebound tenderness present. Lower pole of right kidney palpable, but not tender. Temperature 102°, pulse 112, red blood cells 3,800,000, hemoglobin 80 per cent, white cells 15,400, polynuclears 86 per cent. Diagnosis: Incomplete abortion, with possibly an associated tuboovarian condition.

Following day, December 30, temperature dropped to 100°, pulse 90. Tenderness over hypogastric region less marked.

December 31. Temperature and pulse normal. Bleeding stopped. No pelvic pain, tenderness, or abdominal masses now discernible. General condition, good.

January 2. Temperature, pulse, respiration normal, abdomen soft, no masses or tenderness, no vaginal bleeding, general condition, very good.

January 4. Temperature 99.4. Pulse 90, complaining of slight pain in pelvic region. No tenderness on palpation. Slight vaginal bleeding.

Vaginal examination: Good pelvic floor and cervix; uterus enlarged to the size of eight weeks' pregnancy; pushed slightly over to the left side, tender on manipulation. A doughy mass, size of tangerine orange, moderately sensitive, and firmly attached to the uterine wall, palpated on the posterior median surface of the latter, suggests subserous fibroid, possibly degenerating.

January 6. Vaginal exploration: Cervix found patent and soft; sound passes to depth of three inches in direction of left side, because of prominence impinging into uterine cavity from right wall. Light curettage brought out small amount of broken down decidual tissue and old blood clots. Iodine strip left in cervical canal.

Laparotomy: Upon entering peritoneal cavity, moderate amount of straw-colored free fluid found. Uterus enlarged to size of eight weeks' pregnancy, somewhat irregular in outline, owing to bulge in right wall. The right ovary, which

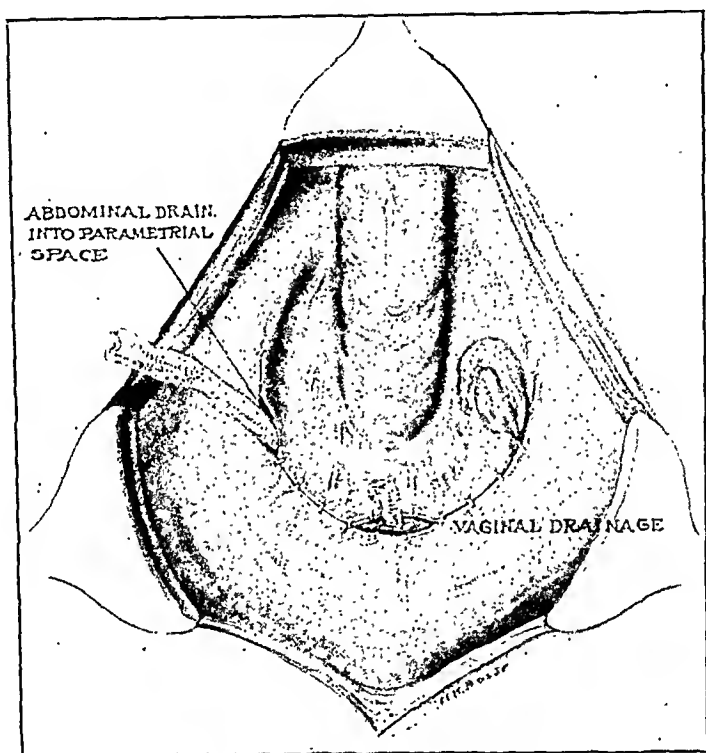


Fig. 4.—Operative procedure (continued) showing uterus, tube, and ovary removed, broad ligament and cervical stump closed over drains as indicated. (Left adnexa depicted, artist's error.)

had been converted into a cystic mass, size of small orange, found plastered on right posterior surface of uterus, tube apparently not involved. The left adnexa appeared moderately injected, ovary cystic, size of small orange. Upon separating the right ovarian cyst, free pus was liberated, thick, yellow, and nonodorous, from a perforation on the posterior median aspect of the uterus. A finger, passed into the opening, revealed an abscess cavity, involving the right wall of the uterus, and extending into the right parametrial space. A supracervical hysterectomy and bilateral salpingo-oophorectomy were performed. This procedure was decided upon, in preference to incision and drainage, because of the extent of involvement of the uterine wall and the general impression that the induration present in the base of the broad ligament, warranted a hysterectomy, in order to open up the tissues and afford better drainage. Upon dividing the right broad ligament, about one ounce of the same pus was evacuated.



The entire right parametrial space was found to contain suppurative products and inflammatory detritus. Owing to the dense exudate infiltrating the base of the right broad ligament, it was found impossible to remove the cervix. There was, likewise, a resulting distortion of the normal anatomic relations which rendered

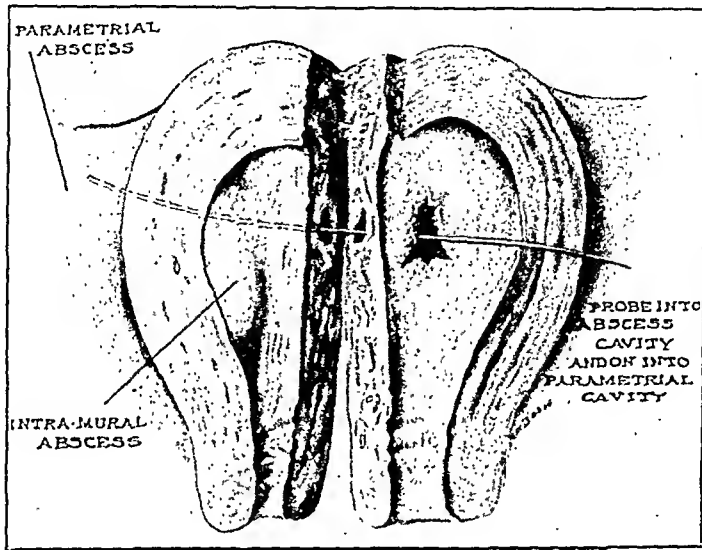


Fig. 5.—Anterior view of open uterus, indicating primary lesion and intramural abscess.

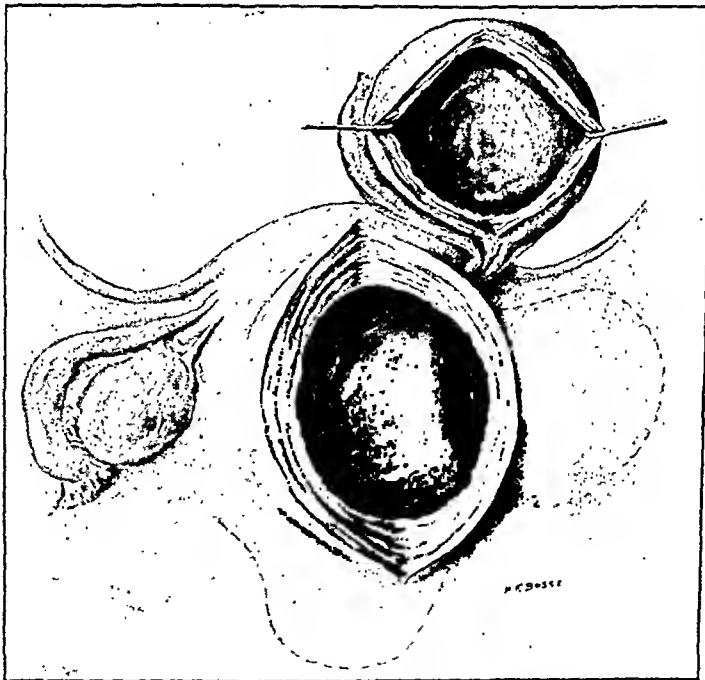


Fig. 6.—Posterior view of specimen, intramural abscess cavity opened, ovarian abscess cavity opened.

impossible the localization of the right ureter, and it was more or less a matter of trusting to luck to avoid injury to the latter. The bladder was extremely thickened and friable, as the consequence of an inflammatory brawny infiltration, making it very difficult to bring the same over the cervical stump in the usual manner.

The iodine gauze strip which had been previously introduced in the cervical canal, through the vagina, was allowed to remain in situ, as a through and through abdominovaginal drain. A second gauze strip was placed through the abdominal route, down to the right parametrial space, leaving the margins of the broad ligament open and separated at this point, for further adequate drainage. A rubber tissue drain was left in the lower angle of the wound.

The immediate postoperative reaction was fairly good, with the assistance of the necessary supportive measures of clyses, stimulating medication, etc. Thereafter, for a period of ten days, the temperature varied between 100° and 104°.

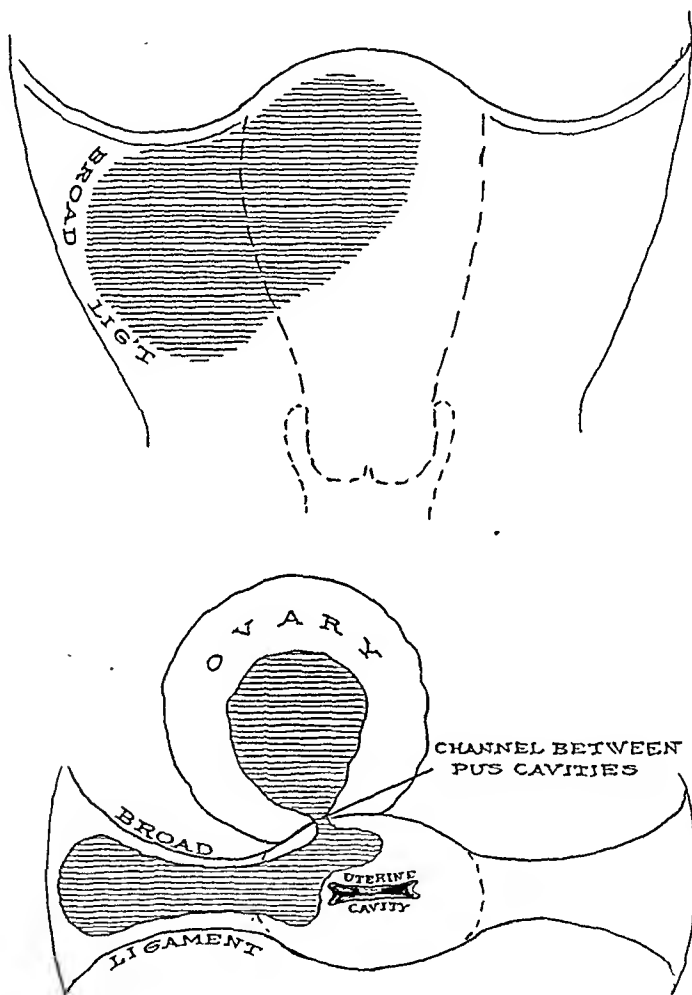


Fig. 7.—Diagrammatic sketch showing relations and extent of abscess cavity.

pulse 100-140. During this interval, the patient's general condition was fairly good, there was a moderate amount of pelvic and abdominal discomfort, accompanied by a rather profuse seropurulent discharge. All drains were removed on the eighth day. On the tenth day postoperative, there developed a discharge of urine from the lower angle of the abdominal wound, probably the result of a suture necrosis involving the bladder wall. This discharge persisted for four weeks, finally ceasing as a result of spontaneous closure of the fistulous opening. During this period there were no other complaints, the general condition continuing quite satisfactory. At the time of discharge, six weeks' postoperative, the wound had healed by secondary intention. Pelvic examination at this time revealed the cervical stump high, fixed, with a small amount of induration in the right fornix.

**Pathologic report:** The uterus is enlarged to the size of ten weeks' pregnancy, the muscle wall is about one inch thick, the uterine cavity is slightly distended, the uterine mucosa is moderately swollen, especially the posterior wall, which is of a dark red color. In the middle of the posterior wall, directly in the center, there is a lesion, about 1 cm. in horizontal diameter, and 1 cm. in vertical diameter. Introducing a probe reveals a wedge-shaped defect, with its base on the uterine mucosa and its apex towards the fundus uteri, probably due to trauma, incident to the curettage. This defect is partly filled up with fresh granulations of a light greyish red color. On section, the uterine wall shows thick and partly patent veins. One of these veins leads into the above described defect; a side branch of this vein is filled with a smeary greyish yellow mass. This latter vein can be followed to the right parametrium, through an abscess cavity which occupies the right lateral wall of the uterus and extends to the parametrial fossa. Both tubes are swollen and of dark red color. They are soft and moist; their lumen does not contain pus. Both ovaries are enlarged, size of tangerine orange; their peritoneal surfaces appear injected. There are multiple small cysts in both ovaries, the largest about the size of a pigeon's egg. The right ovary which has been adherent to and removed from the uteroparametrial abscess, contains a large cavity, filled with a dark red, smeary mass. The wall of this cavity is formed by edematous ovarian tissue, revealing diffuse hemorrhagic infiltration.

**Microscopic.**—Uterus; the wall of the abscess cavity is formed by very cellular granulation tissue, which consists mostly of plasma cells, lymphocytes, intermingled with polynuclear leucocytes. There are plenty of newly formed capillaries and even larger vessels. The latter are seemingly in direct connection with the cavity, and are filled with polynuclear leucocytes. Scattered throughout the uterine muscle there are several foci of granulation tissue, all well vascularized, and containing many leucocytes (polynuclears).

**Tube.**—The mucosa shows no signs of inflammation.

In conclusion, I wish to emphasize the final paragraph of the admirable report of Sampson wherein he states, "Its occurrence (i.e., intramural abscess) as a distinct clinical entity has already been observed a sufficient number of times to warrant a more general recognition of it as such, and it deserves greater attention in obstetrical and gynecologic literature than has been accorded it in the past."

I desire at this time to express my appreciation to Drs. John O. Polak and Leo Schwartz for the privilege of operating upon this service case and reporting the same. I am likewise indebted to Dr. M. Goldzieher for his valuable pathologic interpretations.

875 ST. MARKS AVENUE.

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## ENDOMETRIAL TISSUE IN THE ABDOMINAL SCAR FOLLOWING CESAREAN SECTION

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ENDOMETRIAL tissue in the abdominal scar following pelvic operations must at the present time still be regarded as of rather infrequent occurrence. However, with the great interest at the present time in the subject of ectopic endometrial tissue, which has been



Fig. 1.—Section through entire extent of specimen, showing in upper right corner of section squamous epithelium of skin with sebaceous glands. Fibrous tissue very dense in area below epithelium. Intermediate layer is adipose tissue and dark lower area fibrous tissue. In this area, the endometrial glands are imbedded. A few striated muscle bundles are also found here.

stimulated chiefly by the epoch-making work of Sampson, this lesion may prove to be much greater in frequency than has been suspected previously. As in the case of other lesions containing endometrial tissue which were formerly regarded as infrequent but are now found rather commonly, in particular the lesion in the ovary, so ectopic

endometrial tissue in the abdominal scar may also prove to occur more frequently when interest is focused on this lesion. For this reason I am reporting an additional occurrence of this kind.

The subject of endometrial tissue in the abdominal scar was thoroughly discussed by Heaney in 1925. In reviewing the literature Heaney found that there were twenty-nine cases in which endometrial tissue had been found in scars following abdominal operation. Of these, seven cases were following operations on the pregnant uterus. He added two more cases of his own, and at the same time an addi-

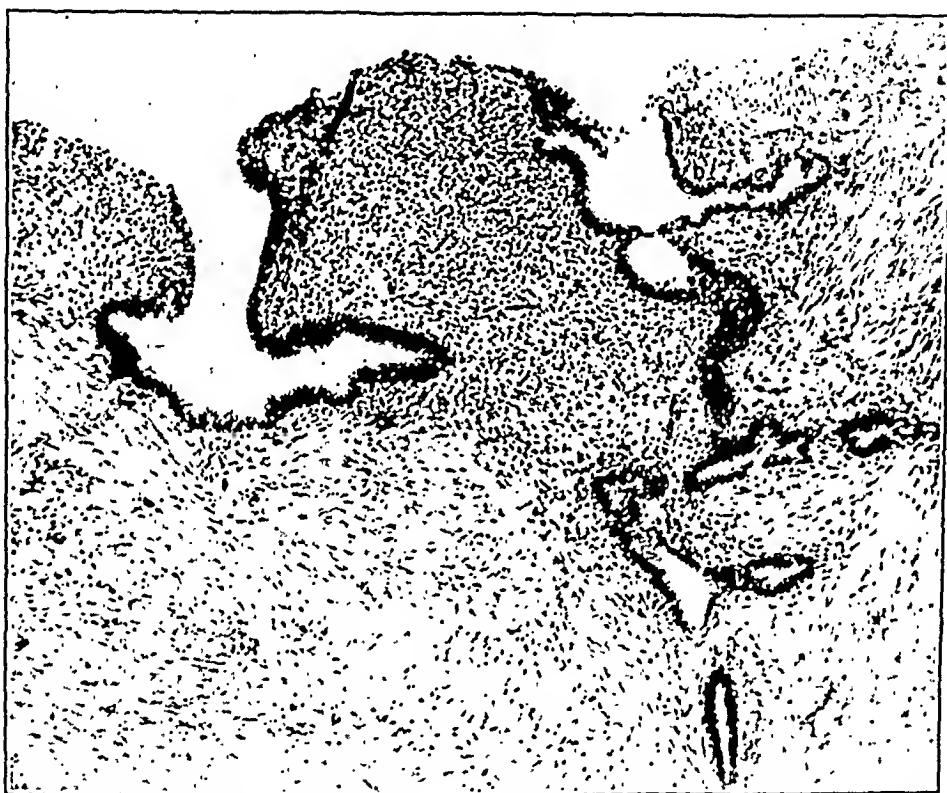


Fig. 2.—High-power showing character of endometrial tissue seen in lower portion of Fig. 1.

tional case was reported by W. C. Danforth, bringing the total up to ten. Of these ten cases, seven followed cesarean section.

Our specimen, which consisted of a small irregular piece of tissue, was presented to me by Dr. George Ives of St. Louis, who had previously made the diagnosis. He obtained the piece of tissue from Dr. A. Trumper of Montgomery, Alabama. The following history was sent with the specimen: The patient, aged twenty-eight years, three years ago had a cesarean section, the indication being eclampsia. A living child was obtained. The abdominal wound healed by first intention and the convalescence was uneventful, the patient leaving the hospital fourteen days after operation. Two years after operation the patient complained of a sensitive spot at the upper end of the

abdominal scar. A nodule was found about one inch below the umbilicus. The growth was removed under a general anesthetic. It was the size of a cherry and not encapsulated; it was found attached to the fascia, was immovable and pale grey in color. After removal of the nodule the wound healed cleanly. On microscopic section the squamous epithelium of the skin was found above a dense layer of connective tissue, under which was a considerable layer of subcutaneous fat. Below this, in a deeper layer of fibrous tissue which also contained some striated muscle bundles, was found a considerable amount of endometrial tissue. There was also some infiltration with small round cells in this area. The glands also were surrounded with definite endometrial stroma. The character of the tissue can best be seen by consulting Fig. 1.

#### COMMENT

The source of the endometrial tissue in these cases is undoubtedly due to an implantation of endometrial tissue from the endometrium of the uterus during the operative procedure. I have observed on two occasions in studying the cesarean scar of the human uterus endometrial tissue along the line of incision. In an experimental study on the cesarean scar in the guinea pig, endometrial tissue was found in several cases along the line of incision, as well as on the peritoneal surface of the uterus. The readiness with which the endometrial tissue developed in these locations in the guinea pig was quite impressive. Additional clinical reports may prove that this can just as readily occur in the human.

If this condition proves to be at all frequent, it may be another point in favor of the low cervical incision in which locality the uterus is lined chiefly by the cervical mucosa, with the possible exception of the extreme upper limit of the incision.

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## A CONSIDERATION OF SOME OF THE ASPECTS OF STERILITY\*

By G. L. MOENCH, M.D., NEW YORK CITY, N. Y.

IT IS only recently that even the medical profession has come to recognize that a childless marriage, with or without a history of gonorrhea, may be the fault of the man as well as of the woman. As a result the proper procedure now in the case of any sterile couple includes an examination of both husband and wife.

I will deal in this paper only with those cases of sterility in which the husband has at least a fair number of actively motile spermia and also possesses the necessary potentia coeundi. I will leave aside such evident causes of sterility as general constitutional defects or disorders and genital hypoplasia or other gross malformations in the female, as presenting no problems of diagnosis. For the same reason I will omit a detailed discussion of the relation of the endocrine disturbances to sterility. While it is true that we may not know how to treat such endocrine disturbances, it is also true that we can in practically every case recognize that an endocrine imbalance of some sort is present. As a result such dysfunctions offer more truly a problem of treatment than of diagnosis and it is the latter field of sterility that I wish especially to take up here.

In the female the two most important single factors of sterility probably are lesions of the cervix and occlusion of the fallopian tubes. The rôle of the cervix uteri in sterility is too well known to require more than a few words. The principal lesions here are congestion and inflammation which may cause sterility by entangling the spermia. This is a purely mechanical action. Even in the presence of pus I have failed to find any definite evidence of a chemical effect on the spermatozoa. As for the possibility of a narrow cervical canal preventing the ascent of the spermia, as was formerly thought, it can today be stated positively that any cervix sufficiently patent to allow the menstrual blood to escape will also allow a spermatozoon, whose greatest lateral diameter is 2 to 3 microns, to pass. I might say here too that I do not consider a retroversion of the uterus *per se* as a cause of sterility. Retroversion in itself does not cause congestion of the uterus or pelvic organs. The vessels in the uterine ligaments are never angulated acutely enough by a simple retroversion to cause obstruction of the venous return, as can be seen by anyone who pro-

\*Read (by invitation) at a meeting of the New York Obstetrical Society, October 12, 1926.

duces an artificial retroversion either at operation or on the cadaver. Congestion, if present, with retroversion of the uterus is due to concomitant causes. That a retroversion will cause sterility because the cervix is pointed forward and lies against the anterior vaginal wall is also to be doubted. Anyone who has done a number of compatibility tests and seen how the semen is deposited over the whole top of the vagina and cervix will attribute little importance to the location of the cervix. Furthermore, the occurrence of pregnancy even in extreme retroversion is adequate clinical proof that such a position of the uterus need not cause sterility.

The closure of the fallopian tubes, up to a few years ago, presented one of the problems of sterility whose solution could only be guessed at. Thanks to the carbon dioxide insufflation of the tubes we now have a ready answer to this question.

Besides these just mentioned, more or less easily determinable, causes of sterility, an investigation of the patient's life and habits, sexual or otherwise, may at times offer a clue as to the underlying cause of the infertility. Again menstrual disturbances and vaginal discharge may help to guide us. The influence of diet on fertility must also be thought of. This problem is still under investigation. Reynolds and Macomber<sup>1</sup> have shown in rats that vitamine deficiency may cause sterility. Whether or not the results of these investigations can be applied to humans remains however to be seen. At the same time it appears to me that, with the varied diet of most persons today, a dietetic sterility will not be common.

Still another cause of sterility may undoubtedly lie in abnormalities of the genital tract which prevent nidation: endometritis, tuberculous or otherwise; hyperplastic or polypoid endometria, and similar lesions may influence fertility but should be easily determinable.

If all the factors mentioned disclose no cause for the sterility, what then? Simply to tell a childless couple that there is nothing abnormal to be found will not alleviate their troubles. The real problem of sterility today, I believe, lies in determining the hidden causes of the infertility in just this group of patients. I will take up, therefore, the various possibilities which are generally offered to explain otherwise undetermined cases of sterility. They fall under one of the four following headings:

1. Selective fertility.
2. Incompatibility of the sexual partners due to
  - a. Vaginal acidity
  - b. Sperma immunity
  - c. Psychic causes
3. Abnormalities of the female germ cells.
4. Abnormalities of the male germ cells.



## 1. SELECTIVE FERTILITY; ALSO CALLED RELATIVE INFERTILITY OR RELATIVE STERILITY

Since sterility and fertility are practically always relative and rarely absolute, I have coined the term selective fertility as being, I believe, more descriptive of those cases where a man may impregnate one fertile woman and fail to do so with another. In many instances such selective fertility can be shown to be due to the fact that the male has relatively few and perhaps not very strong spermia and will achieve impregnation only if conditions in the female genital tract are exactly suitable. A mild cervicitis for example might explain such selective fertility. Again, the more highly developed libido of one of the women leading to more frequent intercourse might reduce the number of spermia and so cause at least temporary sterility. I am, of course, aware that a good many other causes have been advanced as explanation of selective fertility, but it seems to me that the best one can say for them is that they are all theoretic, many of them improbable and some illogical. The supposition for instance that fertility is influenced by the blood grouping of the sexual partners appears especially far fetched. Nature would hardly set about to deliberately limit procreation to certain chance combinations. At any rate selective fertility is uncommon and can rarely be shown to be the sought for cause of sterility.

## 2. INCOMPATIBILITY OF THE SEXUAL PARTNERS

A good deal has been written about the compatibility of the sexual partners. Leaving aside the cervix lesions previously mentioned, and selective fertility discussed just now by itself, we can I believe limit ourselves to the three subheadings given, namely: vaginal acidity; spermia immunity, and psychic causes. I will take these up in the order mentioned.

(a) *Vaginal Acidity*.—I will say right here at the start that I do not believe that vaginal acidity has anything to do with sterility. Vaginal acidity is due to lactic acid. It is the normal finding and the highest values of vaginal acidity are always found in the most normal vaginæ. Any vaginal disease reduces acidity. Furthermore, vaginal acidity, except during pregnancy, practically never exceeds 0.5 per cent lactic acid and I have determined by repeated trials that spermia live for hours in 0.5 per cent lactic acid solution.\* In addition, in considering any possible effects of the vaginal acidity on the spermia it must be remembered that the titrated value of the vaginal acidity will always be reduced by the semen itself and that the volume of the alkaline

\*After I had finished these experiments I discovered that Graefenberg (Arch. f. Gynäk., cviii, Nos. 2 and 3) had made similar investigations. He found that a 1 per cent lactic acid solution killed off most of the spermia in three hours whereas a 0.5 per cent solution left them practically unaffected.

semen far exceeds that of the normal acid vaginal secretion, (and if the latter is not normal it will be less acid). Again, the semen is normally deposited in the least acid portion of the vagina near the cervix. At the same time I admit that a long continued stay of the spermia in the acid vagina will kill them off. Here, however, the question arises how long do normal spermia remain in the vagina. An actively motile spermatozoon, according to Henle<sup>2</sup> will travel 2 cm. in seven minutes. Personal observations agree very well with this statement inasmuch as I have found that actively motile spermia travel between 1 and 2 cm. in eight minutes. With such rapidity of locomotion vaginal acidity is not going to affect the normal and strong spermia but only the weakened or entangled forms. W. W. Williams, D.V.M., of Springfield, Mass., an authority on animal sterility, recently wrote me that in cows he had used antiseptic uterine douches two to three hours after service without preventing conception. This shows again the rapidity with which the spermia travel. I am convinced, therefore, that the compatibility test devised by Hühner,<sup>3</sup>—much as it has been lauded,—is misleading and has done more harm than good because it has prevented inquiry in the right direction. A cervicitis or other lesion which might entangle the spermia can be recognized without a compatibility test and, besides even if spermia should be found enmeshed in the cervical mucus, how are we to judge whether the stronger spermia have not already passed the barrier. If, as is usually the case, the compatibility test is done one hour after intercourse, the real possible impregnators of the ovum will be far beyond our reach, and, whether those left in the vagina are dead or alive depends in most instances on purely temporary local conditions. If the compatibility test, on the other hand, is done very early after intercourse inimical secretions cannot yet have affected the spermia. Dr. Williams, with his experience with animals, corroborates my views in this matter. He told me that he does not depend very much on the motility alone of the spermia obtained from the vagina of the cow, because in many cases he found it hard to obtain motile spermia even with bulls of proved high fertility. Nevertheless, since long-continued acidity is detrimental to spermia, it might be thought that the sodium bicarbonate douches often recommended might be valuable. This, however, can hardly be so since Weil<sup>4</sup> has shown that the beneficial effects on the spermia are only exerted within narrow limits of alkalinity and that a change of the hydrogen-ion concentration in either direction therefrom acts detrimentally. Furthermore, the attempt to save spermia too weak to survive normal conditions may of itself be of rather doubtful value.

(b) *Sperma Immunity*.—Metchnikoff,<sup>5</sup> Landsteiner,<sup>6</sup> McCartney,<sup>7</sup> Mayer,<sup>8</sup> Vogt<sup>9</sup> and many others basing their conclusions on the results of experiments mainly in animals believe that spermia intoxication may

be responsible for some cases of unexplained human sterility. To me this seems little likely. A sperma immunity could only occur where very frequent intercourse takes place. This, however, is very seldom the case with the childless woman who consults us, since in most instances she has been married several years, so that sexual relations have become more or less regulated and are no longer unusually frequent. With my patients at any rate too frequent sexual congress was not present, nor did microscopie tests ever point to sperma immunity as a cause of the infertility. In no case did the blood serum of the wife affect the spermia of the husband any differently than neutral human blood serum in which I have found the spermia to continue actively motile for hours. It is interesting also to note here that Oslund,<sup>10</sup> judging from his experiments, does not believe very much in a specific spermatoxin activity but thinks that many of the results obtained with animal experiments along these lines are explainable by an indirect general reaction of the whole body.

(c) *Psychic Causes of Sterility.*—The tremendous influence of the psyche on the body and its functions is well known.<sup>11</sup> At the same time there are many objections to explaining undetermined cases of sterility as the result of psychic influences. Psychic factors can easily cause disturbance of menstruation, evoke vaginal discharge, and many other gynecologic symptoms but will hardly act directly on either ovum or spermatozoon. I believe the cases of pregnancy following rape and of conception occurring in women to whom sexual intercourse is always abhorrent bears this out.

Admitting nevertheless that selective fertility, incompatibility of the man and woman, or psychic reactions may explain a few cases of sterility, a large percentage of infertile unions must remain undetermined. For this latter group I believe we have to seek an explanation in the possible abnormalities of either the male or female germ cells. I have felt for some time that such abnormalities of the germ cells represent the most important cause of otherwise undetermined sterility. For this reason I have devoted my efforts to the attempt of finding such germ cell changes, more particularly in the case of the male where a direct examination of the germ elements is possible.

### 3. ABNORMALITIES OF THE FEMALE GERM CELLS

Unfortunately we cannot examine the female germ cells directly. At the same time the presence of a normal menstrual history, normal ovaries by palpation and a normal relation between the histologic picture of the endometrium and the menstrual periods will indicate undisturbed ovarian activity and presumably healthy ova. I have also found in agreement with other observers that a normal (bacillary)

flora in a vagina undisturbed for at least four to five days points in the same direction.

#### 4. ABNORMALITIES OF THE MALE GERM CELLS

In the male we are favored by being able to examine the germ cells directly and this is especially important since, unlike the female, the male has no reliable external indicators of a normal gonadal reaction as far as spermatogenesis is concerned. Too often, however, the semen examination consists only in looking through a microscope, seeing numerous motile spermia and concluding that the husband is normal. There is much more to an examination of the semen than that. I will not delay here to discuss the meaning of prostatic crystals or the presence of pus fibrin, blood or epithelial cells in the specimen, nor will I more than mention the possibility of the condom containing a disinfectant which may affect the spermia. Assuming that the microscope—with a No. 2 ocular and a high dry lens shows 25 to 50 or more actively and progressively motile sperm, the next step is to determine how long the spermia remain motile. Some men advise the use of a warm stage for the microscope for this purpose but I cannot agree with them; normal spermatozoa should remain alive for hours even at room temperature; if they do not, it shows that they cannot be fully normal. In such cases then it is not likely that the particular spermia are virile enough to overcome the obstacles necessary to reach the ovum.

In addition to determining the motility of the spermia, a number of authors advise looking for abnormalities of the germ cells and then go on to say that abnormal spermia are not important anyway as long as a sufficient number of motile, normal-appearing cells are present. Furthermore, none of the authors offer any detailed description of what the various abnormal spermia may look like nor could I find any record in the literature that anyone had studied human spermia carefully enough to be able to recognize any but the grossly pathologic forms. Indeed the determination of the minor but nevertheless important abnormalities of the spermatozoa is not always easy but promises to be of great value. In animals, especially bulls, Drs. Williams and Savage<sup>12</sup> have carried on extensive examinations of the spermia and have arrived at very interesting results. Since my own work with human spermia was based on these animal investigations it is necessary, in order to evaluate my own results, to state here briefly the conclusions arrived at by these two men. Drs. Williams and Savage found that the morphology of the sperm head constitutes the greatest single source of information as to the fitness of these cells for reproduction; and, since in average cases the relative numbers of abnormal cells afforded an index to the reproductive fitness of the individual, they recorded alterations of the sperm heads on a proportionate basis. They thus found, for instance, that no bull which had more than 166

abnormal sperm heads per thousand had a good breeding record. In addition to the abnormal sperm heads differences in the size of these structures were also noted. Now it is true that the size of the sperm heads varies somewhat in different animals of the same species; at the same time, within reasonable limits, the sperm heads of one ejaculate should all be of uniform size in normal animals. Drs. Williams and Savage therefore measured and plotted 300 head lengths of each semen specimen. Following this, the functions of the obtained curves were determined by the usual methods employed in biometric studies.<sup>13</sup>

Naturally, examinations of the kind described are only possible with properly prepared and stained smears so that when I first started these examinations I had to determine the best methods of staining the spermia. I found Williams'<sup>14</sup> method by far the best and modified it along the lines needed to suit the smaller human sperm. The stain I use now consists of a filtered mixture of two-thirds Ziehl-Neelsen's carbol-fuchsin and one-third concentrated alcoholic eosin (bluish) solution. To the finished mixture one-third 95 per cent alcohol is added. As a counterstain I use Loeffler's methylene blue to which two parts of distilled water have been added. In this way the heads of the spermia take varying shades of blue, whereas the bodies and tails are red.

The method used in examining these smears was briefly as follows: a thin even smear was made on a clean slide. This was air-dried, fixed with heat, and then treated ten to twenty minutes with a 1 per cent chlorazene solution to remove the mucus. The slide was then carefully washed in water and 95 per cent alcohol, it was then stained four and a half minutes, washed off quickly and counterstained four to five seconds. The stained smears were then examined with a magnification of about eleven hundred diameters and the various abnormal forms counted and tabulated. Usually 1000 sperm heads were counted.

The most surprising thing to me was the close similarity between the abnormal human spermia and those of the bull. Of course, these abnormalities were modified by the difference of size and shape of the two types of spermia but the underlying structural differences were identical. At the same time I found that the percentage of abnormal forms ran much higher in the case of a fertile man than Williams and Savage had noticed in the case of the bull. I have, however, had too little experience at present to know whether this is the normal variation of the species homo or whether civilization has actually reduced fertility in man. Fig. 1 gives some idea of a number of the sperm abnormalities observed. It will be the aim of future work to determine the relative importance of these various abnormalities. At this time I can only say that it seems as if those sperm changes which affect the nucleus are more important than, for instance, cytoplasmic extrusions.

After the described preliminary examination the sperm heads were projected onto a screen at a magnification of three thousand diameters and the apparent size in millimeters of three hundred of them measured. The edges of the field were avoided in this work because of the possibility of distortion.

I started my investigations with the semen of a number of known fertile men and Fig. 2 shows the graphs of two of them constructed from the measurements of their sperm heads. While these curves again agree very well with the graphs of normal bulls, the bases of the curves are a little broader than those of highly fertile bulls. I

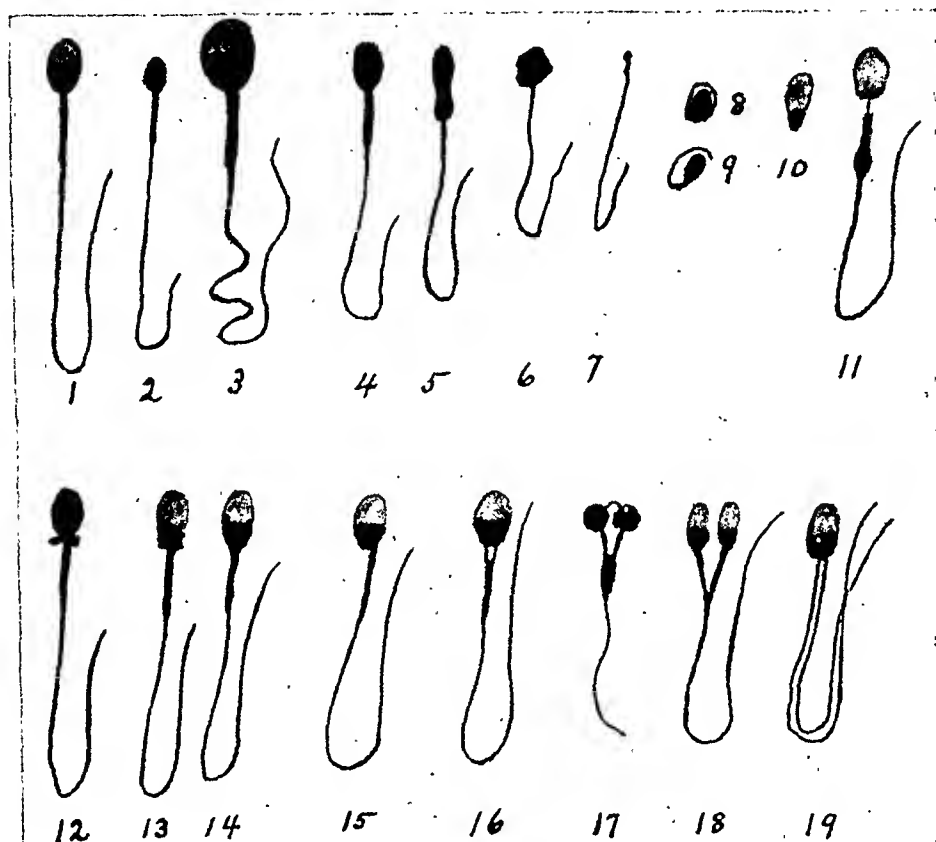


Fig. 1.

am, however, at this time not prepared to offer any interpretation of this fact and it will take hundreds of cases to definitely lay down the limits of normal variation. I have not entered the biometric calculations on the curves because they can only be valuable after a large number of specimens have been measured, whereas at present, because of the time-consuming nature of the work, I have been able to investigate only a small group of cases.

One case (Clinic No. 7743) is interesting enough to report here in connection with the two graphs shown. This woman had negative physical findings and told us that a test had showed her tubes to be open. I therefore carefully investigated the husband's semen and

found the best specimen I have yet seen. There were less than 10 per cent abnormal forms and the cells were nearly all of the same size. We therefore reexamined the wife and repeated carbon dioxide insufflations showed the fallopian tubes closed at a pressure even as high as 240 mm. of mercury.

After a number of fertile men had been examined I picked out cases of sterility in which we could find no explanation for the infertility in the wife. Fig. 3 shows the graphs constructed from the sperm head lengths of two of these. Case C shows a somewhat better curve than D, but in each case the variations in size of the sperm heads are very

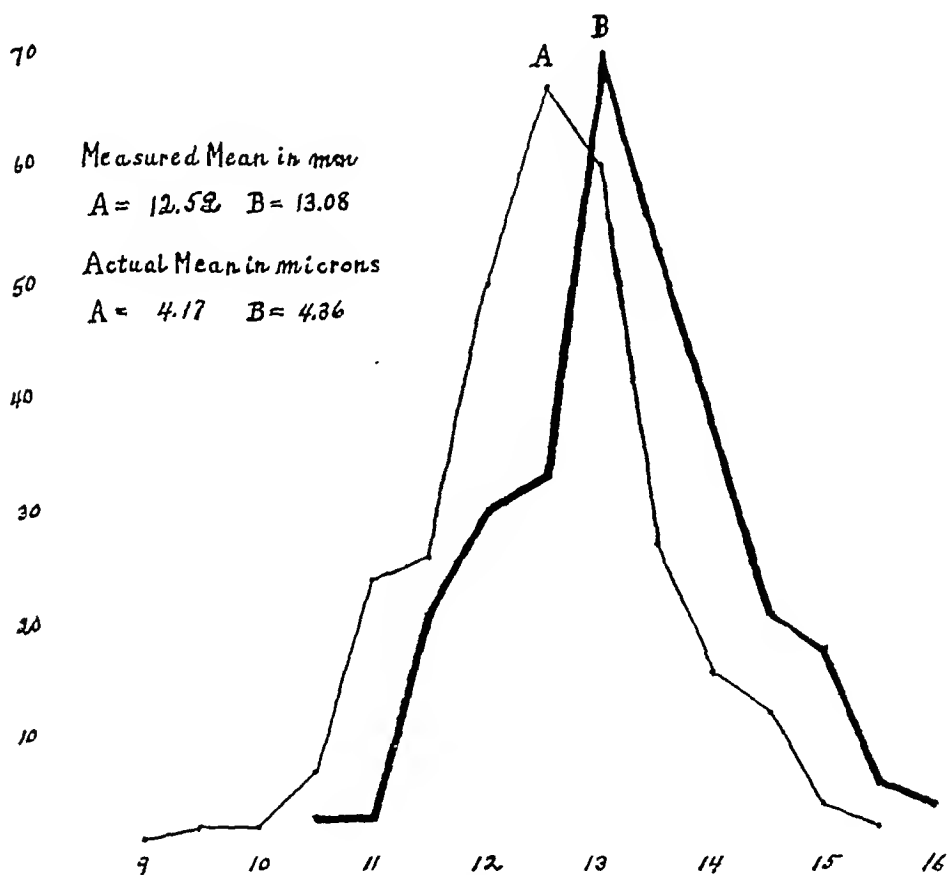


Fig. 2.

marked. Case D is an extremely poor curve. These curves again agree very well with what Williams and Savage have found in bulls with a very bad breeding record.

An interesting graph is shown in Fig. 4. Before examining the husband's semen I believed the woman to be the responsible agent in this childless union since both a mild cervicitis and a slightly lacerated cervix were present and the reading of the carbon dioxide insufflation test of the tubes was rather high. In view of the curve obtained I now think, however, that perhaps the husband is more at fault than the wife. Curve E certainly agrees remarkably well with those graphs

obtained in bulls of questionable fertility and in the cows served by such bulls abortions are frequent.

Of course all the findings I present here constitute only a preliminary report. In themselves they would be rather valueless were

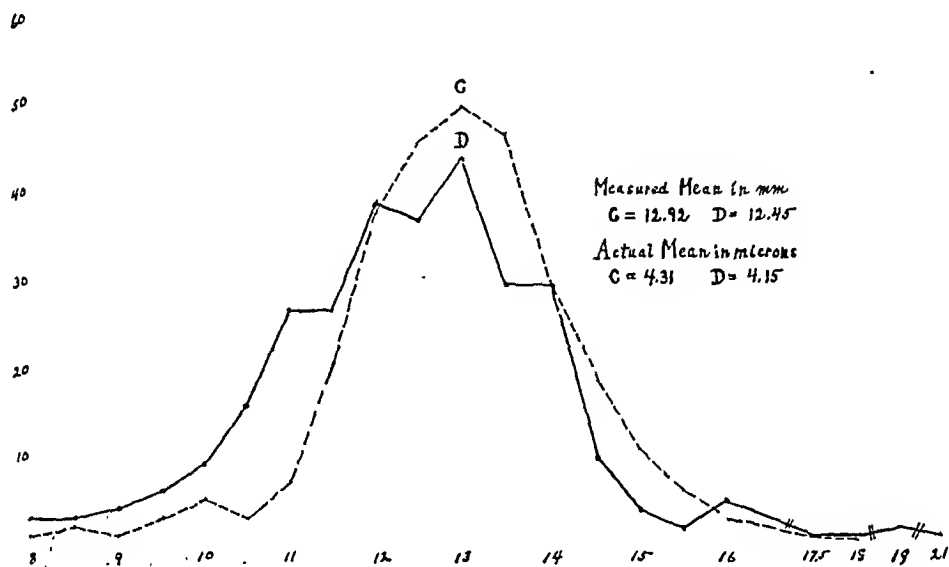


Fig. 3.

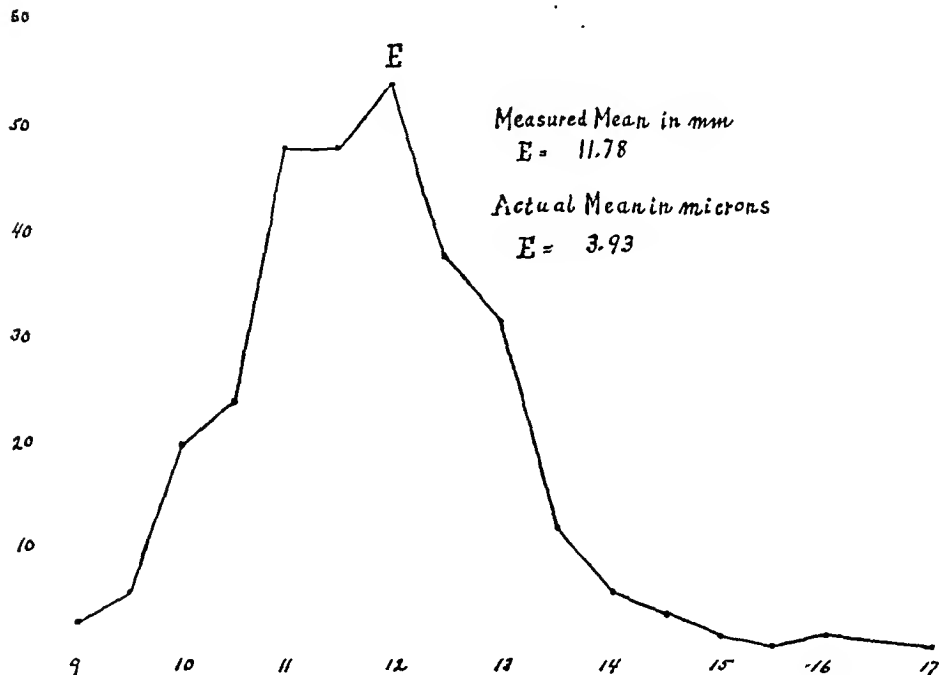


Fig. 4.

it not for the fact that they agree so well with the results of the same investigations in animals. In view of this fact it seems to me that there is a bright prospect of solving at least some of the hitherto unexplained cases of human infertility. One question which has long



puzzled me has, to my mind, been answered by these examinations of the sperm heads. I had often wondered why some men with relatively few spermia were normally fertile, whereas other men with many more spermia were relatively infertile. I believe now that the abnormality of the sperm heads will explain this apparently paradoxical situation.

Due to the general institution of monogamy in civilized countries it will be very much harder to establish the limits of normal variation in man than in animals. We probably shall see that men with relatively abnormal spermia and fairly wide variations in the size of these cells, will still be fertile to a certain extent, due to the fact that intercourse is repeated continually with the same woman.

Aside from the relation of sperm head abnormalities to sterility itself a further large field that must be investigated is the relation of the spermial changes to habitual abortion, hydatid mole and abnormalities of the products of conception in general. In the case of animals it has been proved that pregnancy from bulls with bad fertility graphs often end in abortions. May it not be then that where we have been in the habit of seeking the hidden cause of the abortion in the woman and treated her in all the various ways known to us, the real culprit was the man? May it not be likewise that the abortions occurring in recently married couples are due not to the too frequent sexual intercourse itself but to the increase in sperm head abnormalities resulting therefrom? Perhaps, after all, the habitual abortions have only been an attempt of Nature to avoid abnormal offspring and though much has been written on the treatment of habitual abortion it does not seriously seem to have occurred to anyone to ask the question: "Is it even worth while to try to save these products of gestation?" It seems to me that before we institute any form of treatment in obscure cases of habitual abortion a thorough search for the underlying causes of such interruptions of pregnancy should be made not only in the wife, but also in the husband. Let us be sure first that the fault does not lie with the husband before we indiscriminately treat the wife.

It is evident of course that abnormal spermatogenesis if present can only be the result of some underlying disturbance and it will be our duty to determine why such abnormal spermatogenesis is present and what can be done for the patients so afflicted.

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30 EAST FIFTY-EIGHTH STREET.

(For discussion, see page 394.)

## SEPARATION OF THE SYMPHYSIS PUBIS, WITH A REPORT OF SIX CASES\*

BY SAMUEL W. BOORSTEIN, M.D., F.A.C.S., NEW YORK CITY

SEPARATION of the symphysis pubis or rupture of the pubic joint is not very common in obstetric practice. It occurs, however, with sufficient frequency to warrant a short résumé of the subject together with suggestions for treatment.

It may be of historic interest to recall that up to the time of Andreas Vesalius in 1543, the belief was general that the birth of the child could not be effected until the pelvic cavity had become increased in size by the separation and gaping of the pelvic bones.

Symphyseotomy, which was practiced so much in this country up to a few years ago, is defined by Williams<sup>1</sup> as the division of the pubic joint in order to bring about an increase in the capacity of a contracted pelvis sufficient to permit the passage of a living child. Thus we see that separation can and has been intentionally produced at the delivery but as the after effects were deleterious and the treatment complicated, the method has been abandoned. Kehrer in 1915 collected from the literature 100 cases of rupture of symphysis pubis. Hence this type of injury is not very rare. When rupture of the pubic joint does occur the obstetrician should be prepared to take care of it. I shall discuss only the postobstetric separation of the symphysis and not the traumatic or the one produced intentionally (symphyseotomy).

According to DeLee<sup>2</sup> predisposing causes are softening and relaxation of the capsule, caries, rachitis, osteomalacia, trauma during pregnancy, congenital weakness of the ligaments, have all been found in such cases when even the distention of the pelvis during spontaneous labor may cause the joint to give way. Contracted pelves, especially the justminor and funnel varieties, predispose, because the expansile force acts in the narrow transverse diameter. A large child or especially broad shoulder may act in the same way. The direct causes include improperly directed forceps traction, as by pulling upward too soon or by pulling upward with the patient on a low bed, in both cases the head acting as a wedge between the rami, or using too great force, will produce the rupture, perhaps even in the absence of patho-

\*Read before the Bronx Obstetric and Gynecological Society, May 31, 1926.

logic softening. These facts are important from a medicolegal point of view, but as a rule, the physician may not be held responsible, unless it can be shown he employed undue force in delivery.

*Effects on Labor.*—The effects of separation of symphysis is exactly the same as those of symphyseotomy, viz., the capacity of the pelvic canal becomes considerably increased, particularly in its transverse and oblique, and less so in its anteroposterior diameters. In a gap of 3 to 6 cm. Williams calculates the increase would aggregate 12 or 13 mm. Farabeuf points out that there is a still greater enlargement of the superior strait from an obstetric point of view for one of the parietal bosses fits into the opening between the gaping pubic bones, thereby considerably increasing the space available for the passage of the head. Döderlein has calculated that when the pubic bones gape 6 to 7 cm. the area of the superior strait is increased by one-half.

The symptoms of symphyseal rupture are as follows: Where the predisposing causes are very evident the patient may have complained of pains in the pubis and sacroiliac joints, with difficulty of locomotion for several weeks. During spontaneous labor the rupture may be discovered at the moment it occurs. During the operative delivery, the obstetrician usually notes that the obstruction of the progress of the child has suddenly disappeared. He may feel the joint open. Later the patient complains of intense pain over the pubic joint radiating down the thighs. She cannot move the legs, which lie everted and abducted. Overstretching of the joints without actual rupture sometimes occurs in difficult forceps cases, and makes the woman bedridden for months. There is local pain and mobility between the joints. There may be ecchymosis. There may be gross and palpable separation. In one of my cases there was a separation of 3.5 cm. In many cases separation of sacroiliac joints is also present though it should not occur simultaneously because the separation of the symphysis allows room enough for the child.

A few cases (not obstetric) are on record in which such lesions have been associated with a direct shifting upward of one side of the pelvis, as a whole—an actual double luxation—a lesion obviously to be diagnosed by palpation; a lesion, by the way, proved not so dangerous as it appears.

Injury to the bladder, arthritis of the pubic joint are the usual complications. In symphyseotomy, of course, infection plays an important rôle.

The diagnosis depends on history of a difficult labor, on local pain, tenderness of pubis, mobility, and separation of pubis. The pain is brought out by direct pressure, by alternate pull and push on the thighs, and particularly by forced abduction. Whether the point of separation is between cartilage or between cartilage and bone is hard

to determine even by x-ray. There are no other lesions with which it can be confused.

The orthopedic surgeon does not consider a separation of symphysis per se as a serious injury provided of course that there are no marked complications. He considers that union can be satisfactory and function will be good. Complete recovery is usually obtained in three to four months. DeLee<sup>2</sup> no doubt voices the opinion of the obstetrician when he says that even when recognized early, this accident is very dangerous.

The difference of opinion is perhaps due to the fact that it is the duty of the obstetrician to avoid such an accident and if it should occur, to view the matter as a serious injury. The orthopedic surgeon, whose experience makes him familiar with serious injuries in the pelvic region, considers it only a traumatic injury and treats it accordingly. While for the obstetrician the duration of treatments of three to four months seems tremendous, to the orthopedic surgeon such a period is very common.

#### TREATMENT

It is best to place patient on a Bradford frame as soon as possible to facilitate nursing care. A pillow is placed under the knees to relieve the drag of the extremities upon the pelvis, the knees being loosely bound together for the first week.

A broad strip of adhesive plaster may be applied to the pelvis, the ends being brought around in front and doubled back on themselves to provide a firm support for the insertion of a lacing of bandage or other material which is used to tie them together tightly in front of the pubis. A piece of felt can be placed over the pubic hair to protect against adherence to the adhesive. Later on a webbing belt should be used, encircling the body just above the level of the trochanters and drawn firmly together in front by appropriate straps and buckles. Perineal straps are necessary to retain the belt in position. (Goldthwait's support.)

"In the event of wide gaping of the symphysis (or of similar displacement in a fracture of the rami of the pubes) a broad canvas sling or hammock should be passed under the pelvis and low back, and the ends secured to the overhead beams of a Balkan frame. The pressure of the sling on the sides of the pelvis, from the weight of the patient's body, exerts a strong compressing force on the bones, which tends to push them together. With this apparatus the Bradford frame is unnecessary, and the nursing care is facilitated by suspending the ends of the hammock by means of weights and pulleys so that the patient may be lifted readily when this is necessary. The general comfort is promoted and the deformity more easily corrected if, at the same time, the legs are suspended in Cabot's posterior wire splints and counterpoised appropriately with weights and pulleys, in order

to relieve the pelvis of the strain which their weight imposes." (Wilson.<sup>3</sup>)

The corrective apparatus as extension, hammock suspension, etc., should be continued for a period of two to four weeks. Then they may be removed and greater freedom of the legs permitted. Recumbency should be maintained for four to six weeks. The pelvic belt is then ordered and patient permitted to walk, at first with the aid of crutches. Some surgeons permit free motion in bed to facilitate early fibrous union but the patient is usually uncomfortable.

A word about the delivery of the child. I do not intend to dictate to the obstetricians, I shall merely quote DeLee<sup>2</sup> on this step after the symphyseotomy. "Some operators leave the delivery to nature or wait for later indication, especially in primiparae, but by the majority immediate delivery is practiced. In primiparae I prefer to leave the delivery to nature, as does Stoekel also. The fetal heart is to be auscultated almost continuously and delivery done at the earliest sign of fetal danger.

"Version is generally not advised. The head may be pressed into the inlet from above, or a few pains awaited and then the forceps applied. During the delivery the assistants press the pelvis together from the sides, but I believe Kerr's suggestion to use the Waleher position is better. It is highly important that the mechanism of labor be favorable—a posterior occiput or a brow presentation, therefore, should be corrected previous to extraction. It is my practice to remove the placenta very soon and pack the uterovaginal tract with gauze as a routine."

Williams,<sup>1</sup> on the contrary, says: "After symphyseotomy, the child should be delivered by forceps or version, according to circumstances."

#### REPORT OF CASES

CASE 1. E. M., primipara, age 25. Referred by Dr. H. J. Epstein from his obstetric service at Bronx Hospital on April 16, 1924. Patient had a very difficult labor necessitating high forceps. Sustained a separation of the symphysis pubis, about 3.5 cm. gap; also a separation of the sacroiliac joints. (Fig. 1.) Had a great deal of pain in the front of pubis on motion and also on urination. Was seen by me at the Bronx Hospital a few days later. Physical examination showed a marked gap at the region of symphysis. Pain on any attempt of motion. Adhesive plaster was applied and a sacral compressor of Goldthwait type ordered. In a few days the belt was applied and patient felt much more comfortable. A few days later baking and massage was instituted. It took some time (about four to five months) before she was able to walk. Limped for a while but then made a good recovery.

CASE 2. R. B., age 32, primipara. Referred by Dr. S. Spitzer on Feb. 9, 1926. On December 1, 1925 patient was delivered by forceps, with difficulty. After the delivery, patient complained of pain in the region of the symphysis, also in the back radiating to the right hip. Diagnosis of separation of symphysis was made

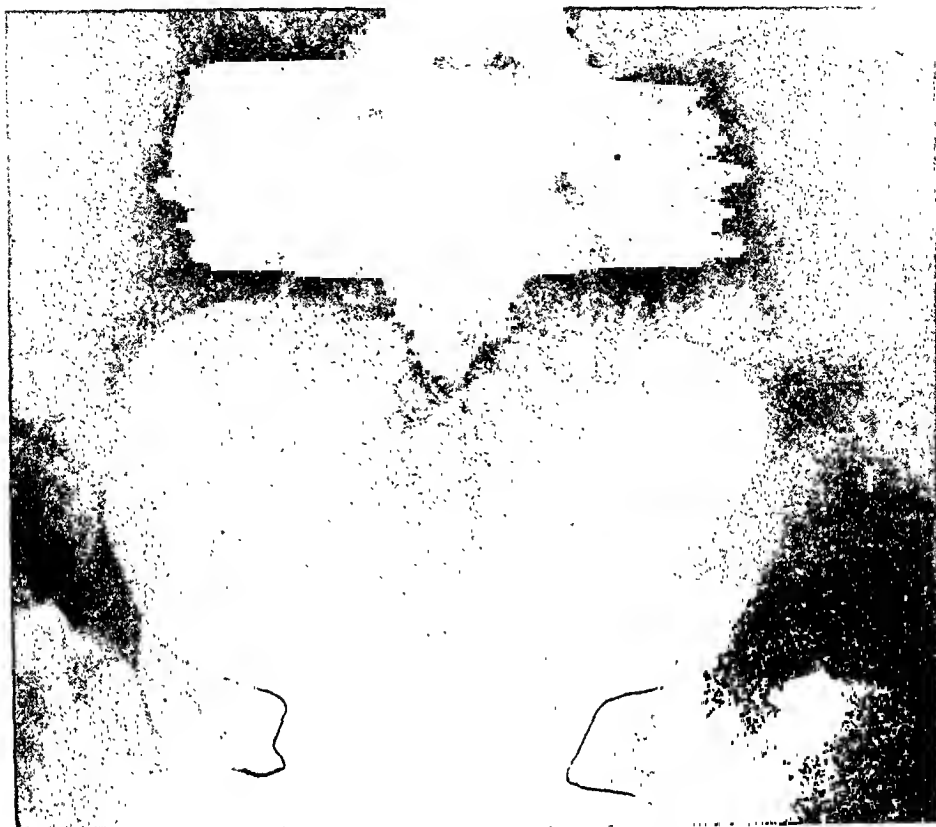


Fig. 1.—Case 1. Note the marked gaping between the two pubes. (8.4 cm.) Note also the separation of the sacroiliac joints (X). (Retouched.)



Fig. 2.—Case 2. Separation of the symphysis (4.5 cm.) and sacroiliac joints (X). (Retouched.)

and patient was admitted to Fordham where the radiograms showed separation of symphysis about 4.5 cm. She was treated by strappings and improved. A few weeks later she still had pain, could not walk without a limp, and one could still detect the separation of symphysis. With the special belt the patient gradually improved. (Fig. 2.)

CASE 3. (Case of Dr. G. L. Broadhead) T. F., fourth pregnancy. Seen by me in eighth month of pregnancy. The other pregnancies were normal; no forceps



Fig. 3.—Case 4. Separation of symphysis (1.2 cm.) and sacroiliac joints (X). (Retouched.)

used. About one week previous to my examination she began to complain of pain in region of symphysis pubis and on turning in bed. Could not walk. No pain while at rest. No pain on urination. Patient looked in good health. Tenderness and separation of pubis felt. On abduction of the left limb had a great deal of pain. Applied adhesive plaster but after a day or two had to remove it. Patient kept in bed, but was not seen again. Dr. Broadhead reported that the delivery was normal. No extra or additional pain was felt. She had pain for about two days and the symphysis became normal.

The following three patients were on the obstetric service of Dr. J. H. Telfair

at Fordham Hospital. He was kind enough to give me the histories and the radiograms for use in this report.

CASE 4. A. H., primipara, age 26 years. Delivered on Dec. 19, 1921 with difficult labor necessitating high forceps. Had separation of symphysis for 1.2 cm. The forceps were not exceptionally hard ones to apply and while child was being delivered, those present could hear the sudden crack at the symphysis joint. No sacroiliac relaxation. Made a complete recovery. (Fig. 3.)

CASE 5. C. L., age 26 years, para iv. Spontaneous delivery on June 12, 1922. Separation of symphysis to extent of one-half cm. Recovered.

CASE 6. J. N., age 24 years, primipara. Separation of 6.5 cm. Admitted on June 12, 1922. Forceps. Good recovery.

### CONCLUSIONS

1. Separation or rupture of pubic joints occurs in obstetric practice and should be guarded against.

2. While there may be predisposing causes, such as softening and relaxation of the capsule, rachitis, or just minor contracted pelvis, the real cause is improperly directed forceps.

3. Symptoms are pain in the pubic and sacroiliac joints, difficulty in walking, and a palpable gap in the pubic joint.

4. Immediate placing the patient on a Bradford frame with adhesive plaster strappings, makes the patient comfortable. Later on a belt can be made.

5. Prognosis is not as bad as the obstetricians would want us to believe. Proper orthopedic treatments relieve the symptoms and help to an early recovery.

*Acknowledgement.*—I desire to acknowledge my great appreciation to Drs. J. H. Telfair, H. J. Epstein, and G. L. Broadhead for their kindness in assigning these patients to me and for their assistance in studying them.

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529 COURTLANDT AVENUE.



## THE "ANATOMIA INFANTIS" OF GABRIEL DE ZERBI

BY LE ROY CRUMNER, M.D., OMAHA, NEBRASKA

THE first work on anatomy printed in the sixteenth century was entitled, Gabriel de Zerbi; *Opus Anatomiae totius corporis humani et singulorum membrorum*, Venice, 1502. In this particular period, all of the anatomic writings were based either on Galen or Mundinins, and the various editors usually were content to reproduce the text of either one of these two authors, with many comments and but slight additional information drawn from personal observation of the external of the human body or from very superficial dissections.

Woodcut illustrations had been introduced in a few books on anatomy in the last decade of the fifteenth century, and so much attention has since been paid to the graphic anatomic incunabula; i.e., Ketam, Hundt, the *Conciliator* of Petrus de Abano, and the *Maragarita Philosophica* of Reiysch, that the books on anatomy without illustration have been almost forgotten. Among the authors who published such early works on anatomy may be mentioned Vassé, Leonicens, Benedicti, Benivieni, Valla, Achilini, and de Zerbi.

The controversies and priority claims of these various authors, many of whom taught anatomy in the Italian universities, have long been settled and are of no particular interest today, but just as Copho's *Anatomy of the Pig* persisted after Mundinius; so Mundinius held sway long after Vesalius, and the ideas of these early anatomists persisted for a long period beyond the time of the brilliant discoveries in anatomy. There are many reasons for the persistence of this belief in pre-Vesalian anatomy, not the least of which was the popularization of these earlier ideas of anatomy by the publication of numerous popular health books, which, originally issued even before 1500, have been copied, issued, and reissued up to the present day. The *Master-work of Aristotle* and the *Secrets of Albert the Great*, each a peculiar mixture of charms and superstition, with early sixteenth century anatomy and obstetrics, are still printed in enormous editions and may be found in almost any secondhand bookshop.

But to return to de Zerbi: Gabriel de Zerbi (1458-1505) was professor of anatomy at both Padua and Rome. He had a most unfortunate life, being forced to flee from his position in Rome on account of theft and soon afterwards was murdered by a slave of the Pasha. His chief work, *Opus Anatomiae*, etc., 1502, was, according to Sprengel, entirely in the method of Mundinius, but, nevertheless, it was based on more or less dissection. He gave a very early, if not the

first description of the round ligaments of the uterus, and properly ascribed the olfactory protuberance to cerebral substance. He also disputed Galen's idea of two umbilical veins, asserting that there was only one.

There is no record of subsequent editions of his *Opus*, and Haller states that the only further appearance of his work is found in an excerpt entitled *Anatomia Infantis* which was printed in the 1537 edition of Dryander's *Anatomiae Corporis Humani*.

Dryander (d. 1560) was professor at Marburg and the author of one of the most important illustrated pre-Vesalian anatomies. The first edition of his book, almost unknown, was in 1536. It had only twenty folios, but it was based on two dissections which he made in the spring of the same year. An enlarged edition with thirty-five folios, with the title *Anatomiae Corporis Humani*, Marburg, 1537, contained added illustrations and increased text and there was also included the first separate printing of the *Anatomia Porci* of Cophlo, and the excerpt from de Zerbi's *Opus* with the title, *Anatomia Infantis*.

In 1541, Egenolph, the Frankfurt publisher, seems to have formed a close association with Dryander. He published the latter's *Anatomia Mundini*, and in 1542, his *Der ganzen Artzenei Spigel Gemeiner Inhalt* which went through many subsequent editions. This association, it would seem, continued until Dryander's death, for as late as 1557, Egenolph issued a new edition of the *Artzenei Spiegel*. This friendship with Egenolph should outweigh Dryander's quarrel with Vesalius and the subsequent ill repute. Egenolph probably caught the popular fancy more completely than any other publisher of the period, and his medical publications, profusely illustrated, were issued under the editorship of Dryander and Ryff, both of whom have been damned by the mispraise of Vesalius. Egenolph's chief editor and best friend was Phillip Melanchton, and it is difficult to condemn entirely men who were associated so closely for years with Egenolph and Melanchton. In his position as editor, Dryander had opportunity to choose the best from the earlier authors, and therefore his selection of de Zerbi's *Anatomia Infantis* stamps it as representing the best knowledge of the period.

In spite of the many difficulties of Renaissance Latin, the following translation fairly represents the ideas of the original.

*Anatomy of the Infant, Taken from the Commentaries of the Distinguished Anatomist, Gabriel de Zerbis*

If the fetus is to be male and by abortion comes out within forty days, the womb being open, coming out from the orifice, together with moisture on to the earth, it will be dissolved because of its tenderness, and will not be found because of its smallness. If, however, the abortion takes place over cold water which is smooth and

clear, a creature will be found by straining, and it will have the appearance of a large ant. And this substance will be found in a kind of a web or membrane, and its head and all its limbs are formed and distinct. And sometimes, when it has recently been emitted, it will be found to have motion of dilation and constriction when it is pricked with a needle, on account of which it is clearly known that this creature is animate; and it is found that its generative organs and eyes are large in respect to its size, for this reason, because as yet, they are not complete and united, but in the fluid matter there comes out the appearance and form of members: and a similar thing happens in the case of other animals, as to the eyes and generative organs, before their full growth; for these members always have great size compared with the rest.

But if what has been conceived is to be female, and through abortion has come out from the womb before three months, that is ninety days, the thing that has come immaturely will be found to have no form; but if it has entered the fourth month, or completed the third, then there will be found a female form; moreover, when it is complete, it is quickly filled out to the final form in which it is born, since a compact thing that is moist, will, after it begins to remain fixed, be formed and completed more quickly than one that is dry.

While the little infant is in the womb, it holds its hands at its chin, Hippocrates said, and its head at its feet; neither is it possible to judge of the truth, nor will you see in wombs, whether the child keeps its head higher or lower; for the fetus, before its motion outward, in the case of natural birth, said Avicenna, undoubtedly is upright, that is, it is in a state of rest and stands or is in position above the feet; and its face is upright and is bent above its knees, and the palms of the hands are supported on its knees and its nose is placed between both knees; and the eyes are above both knees and it certainly draws both knees to an anterior position; and the neck, with the back, is toward the anterior part of its mother; and its face lies inclined toward its mother's back, defending, no doubt, by the hardness of the mother's spine, the heart of the fetus from external injuries.

The reasons for its position is: because then this position is more convenient for making a turn, that is to say, at the time of birth, above the head, since its egress is thus a better egress; then also because it occupies a smaller place, although there are those who say that this position is only that of the male; Avicenna, namely, said its disposition is such, that is of the male; of the female the disposition is the reverse; yet this dictum is lacking in reason, but its position in the uterus is different from the position of the fetus of most others in the class of brutes. For every quadruped animal is placed stretched out in the womb on account of the length of the womb. But the animal that lacks feet lies along its side, as can be seen in the dolphin and whale and other fish that generate their like in the uterus. The biped animal, however, rests curved-in from the womb just as birds in the egg and man in the womb; that is, they rest in the womb curved inward; because in this way the nose of the human being is between its knees and its eyes above its knees and the ears outside its knees when the human being is in the uterus. And this position is certainly for the purpose of some protection of the heart, Avicenna said in the case of animals; and this method is more suitable for protecting itself, that is to say, from injuries that might come to it from without.

The fetus is attached to the womb, with the secundines as a connective, with the veins joined to its liver, but with the arteries that are in the secundines connected with the heart; the covering of all of these is the umbilicus until they unite at the fetus of the mother. It also has some connection with the father and the parts of his body through the formative virtue derived from the father's generative power which is in the seed and creative spirit.

This, then, is the authoritative professional understanding of embryology at the beginning of the sixteenth century.

We scarcely realize today how quickly during the Renaissance, the "latest" theories were disseminated in the popular health books written in the vernacular for the benefit of the common people. Such a sequence or contrast may be shown by comparing de Zerbi's opinions with a chapter on the same subject taken from a popular health compilation of an unknown author of almost the same date: *Ain gut artznei*, etc. Froschauer, Augsburg, ca. 1505. (Sudhoff No. 120.)

This little tract printed in German is an early type of the pseudo-scientific health books, and Chapter "E" may be translated as follows:

"How a child is at first in the mother's belly/ In the first month, it is a blood clot; In the next month, it has the beginning of a belly/ In the third month, it has a belly/ In the fourth month, it receives a navel/ In the fifth month, it has something similar either to the father or to the mother/ so that one can see if it is a boy or a girl/ In the sixth month, it has vessels all over its belly just like a man should have/ In the seventh month, it has bones in its limbs/ In the eighth month, these become stronger and stiffer/ And in IX month, nature separates it and promptly throws a well made child from darkness to the light of day."

I wish to acknowledge my indebtedness to Dr. J. A. Rice, Jr., Professor of Classic Languages, University of Nebraska, for his aid in the translation of de Zerbi.

CITY NATIONAL BANK BUILDING.

## THE TIME OF OVULATION AND THE PROGNOSIS OF ARTIFICIAL INSEMINATION\*

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IT IS striking that the principal event in the cyclic genital functions of the human female, the time of ovulation, still remains a matter for discussion. Four different methods have been used to determine the time of ovulation. Fraenkel, of Breslau, was the first to observe the aspect of the ovary during laparotomies performed for various reasons, and he found that, on the average, on the nineteenth day after the onset of the last menstruation there was found a large corpus luteum, of intense red color, bleeding easily. Neglecting the time necessary for its development, he concluded that ovulation must occur on the eighteenth or nineteenth day after the onset of menstruation. A similar way with similar results was followed by two Frenchmen, Aneel and Villemin, who declared the sixteenth day was the usual day of ovulation. The special merit of Fraenkel's studies was, first, that he had found a way of accumulating data from a great number of actual observations, and secondly, that he reckoned from the beginning of menstruation, instead from its end, the latter date being far more uncertain and variable than the first. Deeper knowledge of menstruation itself, which really began only with Hirschmann's work in 1908, explains this fact; the onset of menstruation suddenly interrupts the uterine changes that prepare for gestation, but restitution of the destroyed mucosa does not always require the same number of days, being continued gradually and without exact limitation into the resting state of the mucosa of the interval.

Opposition to Fraenkel's views came from Robert Meyer, of Berlin, and his pupils. They worked on anatomic material secured at gynecologic operations, and found that ovulation occurs in the first half or in the middle of the menstrual cycle. Meyer considers an average of the ninth day (after onset of menstruation) to be the rule for a healthy young woman, while Schroeder claims it to be the fourteenth to the sixteenth day. Corner's observations on apes come nearest to this.

Both methods are objectionable in that they are not based on perfectly healthy women; Fraenkel's patients were laparotomized for a variety of pathologic conditions, some of which could have deranged the

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cycle, especially in postponing the ripening of the follicle and the beginning of the menstrual flow, and Meyer's and Schroeder's patients were suffering from genital diseases, particularly from carcinoma in initial stages. It is true that carcinomata might disturb the cycle less markedly than extragenital illness. Hence the earlier date as given by Meyer-Schroeder apparently offers the greater probability of correctness.

A third method, first used by the anatomist Triepel of Breslau, consists in an attempt to determine the beginning of development by considering the young embryos of known age, as recorded in the literature. My own investigations of material of this sort demonstrated that there is no rule to be found; development may begin at any time of the cycle, the average calculated from the cases hitherto reported indicating broadly that first development begins in the majority of cases about in the middle of the cycle.

But there is still a fourth way to determine the date of ovulation, and this consists in finding the time of natural optimal fertility or the average conception day. All statistics, relating conception to the menstrual cycle, show a very marked optimum at about the eighth day (after onset of menstruation). But there is no day when fertilization could not occur, perhaps with sole exception of the first day of menstruation.

Before considering a way to harmonize these conflicting data, a word should be said about the vitality of the sex cells. It is generally admitted and in fact cannot be denied, that the sperm cells might survive and remain motile in the female genitalia for several days and even some weeks; but it is probable that on the average this time is rather short, from one to two days. In rodents it is even below one day, and in man the same is probably true for young people with frequent sexual intercourse, where sperm would be accumulated if it were not destroyed, and where that curious and not fully understood process of immunization of the woman against sperm may occur, perhaps as a result of quick dissolution and resorption of sperm. Such immunity may be the cause of sterility, although both partners are in evident health, and may be eliminated again by temporary separation of the couple for some time, say several weeks or perhaps better several months.

In any case, we have not the slightest proof for the supposition that the survival of spermatozoa is the rule, and it is quite unjustifiable for one author to combine the optimum of fertilization (eighth day) with the time declared by Fraenkel or Schroeder as the ovulation date (nineteenth or fifteenth day), by supposing a regular or physiologic waiting-time for the sperm cells. The latter certainly are not more apt to fertilize after a stay of some days in the fallopian tube; they must be less apt to do so, if indeed (as has not yet been

determined) they can do so at all. Motility is not identical with normal fertilizing power.

Other factors enter into the consideration of the female sexual cell, the ovulum. Before being fit for fertilization, the ovulum must undergo two cell divisions, called the maturation-divisions, which result in the formation of the polar bodies that are expelled from the cell. Maturation occurs in all cases of sexual reproduction, not only in vertebrates or in animals generally, but even in plants. In mammals, maturation seems always intimately connected with the rupture of the follicle, but at the end of the process the nucleus of the ripe ovulum is not reconstructed. It is awaiting fertilization in quite a labile state, and if fecundation does not occur within a relatively short time (comprising only hours and probably always less than twenty-four hours), the ovulum degenerates and is lost. This has been demonstrated histologically and more recently, by American authors, experimentally as well. Besides, such an ovulum is always promptly seized by the mechanism provided for its transport (movement of the cilia and peristalsis of the tube) and carried down the genital tract, being expelled if not fertilized; there is no place where the ovulum could await the spermatozoa. Consequently, the moment of ovulation must practically be identical with the moment of insemination or of the beginning of development, and if this moment is missed, fertilization cannot occur. We may therefore say, that though spermatozoa may possibly await the ovulum, the ovulum can never wait for the spermatozoa.

In its bearing on the question of artificial insemination, this knowledge is of primary importance; if the ovulum survives ovulation only for a few hours, artificial fecundation cannot be expected to succeed if not done just at this time.

A fixed date of ovulation is a postulate of physiology. Comparative physiology shows that ovulation is connected with heat (estrus), and therefore formerly it was generally believed that ovulation should coincide with menstruation or perhaps precede it for only one to three days. The work especially of Robert Meyer showed that the cyclic development of the follicle and its transformation into the corpus luteum determines the transformation of the endometrium and that there is no menstruation without a corpus luteum on the way toward regression. Hence the regularity of menstruation depends on regular changes in the follicle.

It is difficult to reconcile with this view the differences in the time of ovulation, as determined by the various methods of investigation, and it is still more difficult to explain the apparent and considerable variability in this time, as demonstrated by every one of these methods. The optimum time for impregnation, the eighth day, seems to me to be of greatest importance in this connection, because fertilization is

certainly the primary object of these genital processes, and we may regard the conception optimum as indicating the moment of greatest vitality of the germ cells. The various anatomic and autopsic investigations, however, point to a later ovulation time. Fertilization also may occur at a later time. With an invariable ovulation time this fact could not be explained—except by the assumption that the menstrual cycle was delayed in such cases, in other words, that without fecundation, the menstruation would have appeared later, but these cases are too frequent to permit such a supposition. A plausible explanation may still be offered by assuming that there are two ways of ovulation. In mammals ovulation may occur either spontaneously or incident to copulation; in the majority of instances it is spontaneous, but in the rabbit and the cat and perhaps some other rodents and carnivora (the ground-squirrel and the ferret) there is no ovulation at heat without mating, and it is actually provoked by the latter. The development of the corpus luteum in these animals depends upon copulation. Without it the follicles show regressive changes after heat, and so afford to new follicles the possibility of ripening and producing heat anew.

For the human female, Robert Meyer has shown that the changes in the epithelium of the follicle, leading finally to the formation of the corpus luteum, have already begun before rupture of the follicle, and are, to a certain though not yet sufficiently determined degree, independent of rupture; therefore ultimately the ovulum itself determines the whole sexual cycle and the date of rupture of the follicle has not the same importance for the cycle as it would have if the development of the corpus luteum could begin only with the moment of rupture.

In the human female, ovulation has previously been generally considered as spontaneous, and there is no doubt that as a rule ovulation occurs between two menstruations, independent of sexual intercourse. But in addition to this, some gynecologists and anatomists admit that ovulation may be induced by copulation, calling it then violent or provoked ovulation. Incontestable proofs of this view are wanting. Proofs could only be statistical, in view of the dubious character of the whole matter, and single laparotomy or autopsy records should be of little value; but even such are not known.

Nevertheless, we feel justified to combine this idea with the results of investigations on the date of ovulation. Spontaneous ovulation may occur at the middle of the cycle, when differentiation of the fibrous wall of the follicle has sufficiently progressed. Such a follicle, however, has already been for some time in a labile state, and with sexual intercourse the rupture might then take place already at approximately the eighth day, that is, about a week before the regular time for spontaneous rupture. Under both conditions the develop-



ment of the epithelium of the follicle proceeds nearly in the same manner, so that for the sexual cycle the date of actual rupture would be almost or entirely without importance.

Another possible explanation would be that ovulation might be postponed by a mental influence, especially by fear; a similar effect has been demonstrated for spermatogenesis in people condemned to death, and perhaps all these later dates for ovulation, as ascertained in anatomic material or in operated women, might be in part due to this factor.

In any case, while we concede that development of the follicle and rupture, to a certain degree, are independent from each other, we must again emphasize the strict dependence of the life of the ovulum upon such rupture. The latter provokes the maturation of the ovulum, as already stated.

In this manner, however, only a part of the difficulties of the problem are eliminated. How shall we explain the fact that impregnation is also possible long after spontaneous ovulation at the normal time? One way would be to admit the rupture of a second follicle; but this is very improbable, as observation shows that twin follicles or corpora lutea are rare and, if they are present, they always exhibit the same stage of development. Another possibility would be that in such a case the spontaneous rupture had been delayed and then actually took place under some external influence, especially that of the fertilizing copulation. In such cases the ovulum ought to have survived longer than is generally the case in follicles not having come to rupture. Why sometimes the closed follicle could exert such a protective influence on the ovulum, and how long the survival of the latter may last, is uncertain; but if, then, the ovulum is set free and, after maturation and impregnation, starts on its way down to the uterus, it may frequently find there a mucosa already too far progressed in its normal development for menstruation, and the fixation of the ovulum may not be possible or, if occurring, it may be followed by early abortion. This possibility has been demonstrated by a number of very young human ova, among them especially by the celebrated case of Teacher and Bryce, where ovulation seems to have occurred only on the twenty-third day of the cycle.

We have already referred to the importance of these deductions in regard to artificial insemination. For the success of the operation it is necessary to be carried out as near as possible to the moment of ovulation. If we admit a spontaneous ovulation at about the fourteenth to the sixteenth day, and an ovulation provoked by copulation at about the eighth day, we must treat differently those cases where a sexual act can take place between the partners, from those where insemination must be tried without coitus having occurred. In the former case the (repeated) operative insemination should begin with the seventh or eighth day, in the latter with the fourteenth day. But success is always uncertain, and repeated experiments will be required. One fact may already be stated at the present time, namely, that a

success on (or after) the nineteenth day is quite improbable, although this time was specifically recommended by Miller who based his advice on Fraenkel's deductions.

There is scarcely any need to emphasize that medical help by artificial procreation should only be attempted in instances of traumatic impotence; even in nervous cases, the offspring will not be desirable for society, and in cases of congenital malformations of the genital organs the danger of transmission of the malformation should keep us from interference.

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#### ABDOMINAL CESAREAN SECTION IN DETROIT IN 1926\*

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RUDOLPH HOLMES<sup>1</sup> has said that "many a cesarean section has been done for indications which have been exceedingly specious, indications which are far fetched. These cesareans never will be reported for there was no real justification for their performance. Many of these operations are exemplifications either of the lack of judgment in placing indications, or of ignorance of true obstetric facts. Many a time, as rumors are bandied about of a cesarean section being done for strange reasons, we could not question the surgical ability of the operator, but we must concede his lack of obstetric equipment. It is not right for the surgeon, gynecologist or others to lay down the indications for a grave obstetric procedure when he, perhaps, never had had an obstetric experience, or his limited experience may have been obtained many years before. It is a pernicious system and looks not for the best interests of the patient. At least he should defer to the judgment of the obstetrician, to the man who has an abiding interest and contact with the specialty. And yet it is not alone the man whose training fits him for other fields of medicine who is forgetting the obstetric principles, but too often the obstetricians themselves have boldly seized upon cesarean sections as a ready and quick means of getting through with a case. How easy it is to spend some thirty minutes in performing a cesarean, and how hard it is to perform a Hicks version, or perhaps introduce the bag, and then to

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<sup>1</sup>Surg. Gyn. and Obs., 1915, xxi, 641.

await the time for the work to be completed, sitting up half the night perhaps. How loath the gynecologist is to give up to his assistant even a minor thing like a simple perineorrhaphy, and yet too often the complicated obstetric case is left to the tyro of the clinic because it is 'coming off' in the small hours of night."

J. Whitridge Williams<sup>2</sup> has also said that, "generally speaking, I consider the operation is being abused in two ways: first, that it is frequently employed unnecessarily; and secondly, that, even when strictly indicated, it is not always performed at the time of election, with the result that its mortality becomes needlessly high. The prime factor in bringing about this abuse is defective medical training, with consequent ignorance of the wonderful adaptability of nature, and of the resources of obstetric art."

The ease of performance has increased the incidence of abdominal cesarean sections very greatly in this country. While there are no definite statistics to show the exact rate of increase, those in practice during the past quarter of the century realize that this operation has increased from a rare surgical procedure to an everyday occurrence. In twenty-two years in Detroit this operation has increased at a rate over seven times as rapidly as the increase of population. Dr. W. H. Davis, Chief Statistician, Vital Statistics of the Bureau of Census, U. S., gives the following increase of deaths from cesarean section in the registration area of the United States:

1921	247 deaths
1922	266 "
1923	285 "
1924	304 "

There are vague and incorrect opinions as to the frequency and safety of abdominal cesarean section, not only among the laity but among the medical profession. Hardly a physician knows the number or results of sections in the hospital in which he works. In order to show the frequency and results of abdominal cesarean sections in Detroit, a survey was made of all sections performed in the city during the year 1925. Because of the incompleteness of records in many of the smaller hospitals, it was difficult to get even meager details of the work done in them. As far as possible this information was obtained from the operator directly.

During the year 1925 there were 32,130 living births and 1350 stillbirths in the City of Detroit, a total of 33,480 births recorded, of which 10,425 occurred in hospitals, an incidence of over 31 per cent. Approximately 30 per cent of white babies and 58 per cent of colored babies were born in hospitals in this city. Five hospitals: Grace,

<sup>2</sup>Surg. Gyn. and Obs., 1917, xxv, 194.

TABLE I. RATE OF ABDOMINAL CESAREAN SECTION IN FIVE LARGE HOSPITALS OF DETROIT IN 1925

HOSPITALS	CASES	SECTIONS	INCIDENCE
Grace	1000	31	1 to 31.2
Harper	1197	39	1 to 30.7
Kiefer	1428	10	1 to 142.8
Providence	2065	10	1 to 206.5
Woman's	1230	10	1 to 123.
Total	6920	100	1 to 69.2
City at large	33,480	154	1 to 217.

Harper, Herman Kiefer, Providence, and Woman's, each had 1000 or more births during the year. In these five hospitals 100 abdominal sections were performed in 6920 deliveries. In the fourteen hospitals in which there were less than 1000 deliveries during the year there

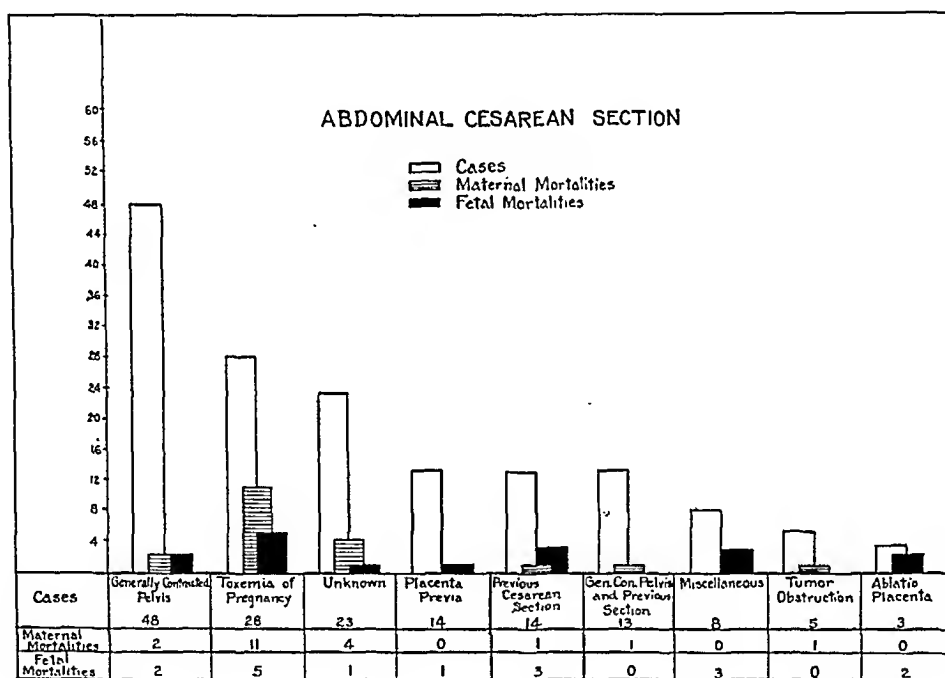


Fig. 1.—Showing incidence and mortality from cesarean section.

were 54 abdominal sections performed, or one section for every 65 deliveries. In the entire nineteen hospitals there were 154 abdominal cesarean sections in 10,425 deliveries, or one in 67.7 deliveries. In the entire city there were 154 abdominal sections in 3480 deliveries, which is one in 217. If the 11 vaginal hysterotomies are included, there were 165 sections, or one in every 203 deliveries.

A surprising variation in the percentage of sections done in various hospitals was found. In the five hospitals with over 1000 births, the rate of abdominal sections to all deliveries was as follows: Grace, 1 to 31.2; Harper, 1 to 30.7; Herman Kiefer, 1 to 142.8; Providence, 1 to 206.5; Woman's, 1 to 123. It is to be noted that one of this group had an incidence of sections almost seven times as great as another.

In the remaining 14 hospitals, each of which had less than 500 deliveries, the rate of abdominal cesarean sections was as follows: Booth, 1 to 135; Crittenden, 1 to 471; Deaconess, 1 to 73.1; Dunbar, 1 to 20; Delray, 1 to 50; East Side, 1 to 62; Ford, 1 to 97; Grace Annex, 1 to 63; Jefferson Clinie, 1 to 1; Marr, 1 to 106; Mercy, 0 to 6; Lincoln, 0 to 189; St. Joseph's, 1 to 34; and St. Mary's, 1 to 24.5.

TABLE II. RATE OF ABDOMINAL CESAREAN SECTIONS IN FOURTEEN SMALL HOSPITALS OF DETROIT IN 1925

HOSPITAL	CASES	SECTIONS	INCIDENCE
Booth	270	2	1 to 135.
Crittenden	471	1	1 to 471.
Deaconess	439	6	1 to 73.1
Dunbar	40	2	1 to 20.
Delray	150	3	1 to 50.
East Side	250	4	1 to 62.5
Ford	388	4	1 to 97.
Grace Annex	314	5	1 to 63.
Jeff. Clinie	1	1	1 to 1.
Lincoln	189	0	
Marr	318	3	1 to 106.
Mercy	6	0	
St. Joseph's	375	11	1 to 34.
St. Mary's	294	12	1 to 24.5
Total	3,305	54	1 to 65.
All hospitals total	10,225	154	1 to 66.4
City at large	33,480	154	1 to 217.

Eighty-eight (57 per cent) abdominal sections were done by obstetricians. Sixty-six (43 per cent) were done by surgeons. Included as surgeons were a number of general practitioners who do some surgery.

There were 20 maternal deaths (13 per cent) and 17 infantile deaths (11 per cent) in the 154 abdominal cesarean sections. Infantile deaths include stillbirths and neonatal deaths.

In 11 vaginal hysterotomies, two women died (18 per cent). In this group seven infantile deaths occurred (63 per cent).

For obvious reasons it is impossible to compare the death rates of surgeon, obstetrician and general practitioner.

Because of the incompleteness of records in many of the nineteen hospitals included in this survey, it was impossible to get much information of value on this subject. The only facts which were certain were the incidence of abdominal section and the maternal and infantile death rates following these.

Even such important facts as indications were often missing or not verified. So, in one hospital where six sections were done for pelvic contraction, no pelvic measurement or other proof of such contraction was shown.

In the cases of placenta previa there was merely the statement of the operator that this condition existed, without any description.

Most of the records for eclampsia and toxemia were inadequate. Among the unusual indications given without support of any evidence that section was essential were obstructed labor, immobility of pelvis, absolute inertia of the uterus, tuberculosis of the hip, transverse presentation, and insufficiency of uterine musculature.

Of the total 154 abdominal sections, forty-eight were performed because of contracted pelvis and thirteen because of previous sections in contracted pelvis. (This was 40 per cent of all sections.) In these sixty-one cases there were three maternal deaths (5 per cent) and two infantile deaths (3.4 per cent).

TABLE III. HIGH ABDOMINAL SECTIONS, DETROIT, 1925

INDICATION	CASES	MATERNAL DEATHS	INFANTILE DEATHS
Contracted pelvis	45	2	2
Toxemias	23	10	4
Unknown	23	4	1
Placenta previa	14	0	1
Previous section, contracted pelvis	13	1	0
Previous section	13	1	3
Miscellaneous	6	0	2
Tumors	3	1	0
Ablatio placentae	3	0	2
Total	143	19	15

There were twenty-six abdominal sections for toxemias of late pregnancy and eclampsia, an incidence of 17 per cent in a total of 154. There were eleven maternal deaths (42.7 per cent) in this group and five (19 per cent) infantile deaths.

In the group in which there was no indication stated and in which there was no evidence on the records to show why a section was performed, there were twenty-three cases (15 per cent). Four mothers died in this group (17.5 per cent) and one infant (4 per cent).

There were fourteen women sectioned for placenta previa (9 per cent of all sections): There were no maternal deaths and one fetal death (7 per cent) in this group.

There were fourteen sections (9 per cent of all) because of one or more previous sections in women in whom there were no pelvic contractions. In this group were one maternal death (7 per cent) and three infantile deaths (21 per cent).

The group classed as miscellaneous included abdominal sections performed for various maternal pathologic conditions, and comprised eight cases (5 per cent). There were no maternal deaths, but three (36 per cent) infantile deaths resulted.

There were five sections because of obstructing tumors (3 per cent of all). This group had no fetal deaths and one maternal death (20 per cent). There were three cases of ablatio placentae sectioned

(2 per cent of all). These resulted in recovery of all mothers and death of two infants (66 per cent).

The maternal mortality for the high abdominal section was 13.3 per cent, while that for the low section was 9 per cent.

The infantile mortality for the high abdominal section was 10.5 per cent, while that for the low section was 18 per cent.

The maternal mortality for vaginal hysterotomy was 18 per cent. The infantile mortality following the same operation was 63 per cent.

The maternal mortality for all abdominal sections was 13 per cent. The infantile mortality following this procedure was eleven.

TABLE IV. LOW CERVICAL SECTIONS IN DETROIT IN 1925

INDICATION	CASES	MATERNAL DEATHS	INFANTILE DEATHS
Contracted pelvis	3	0	0
Toxemias	3	1	1
Tumors	2	0	0
Previous section	1	0	0
Uterine inertia	1	0	1
Miscellaneous	1	0	0
Total	11	1	2

Of 220 maternal deaths following childbirth in Detroit in 1915, twenty-two died after abdominal or vaginal section (10 per cent of all puerperal deaths).

In the City of Detroit one woman out of every 532 delivered had an abdominal cesarean section for contracted pelvis. This is probably about the rate that should prevail were good obstetrics generally practiced in the city. The errors of commission probably overbalance those of omission in choice of abdominal cesarotomies. A survey of the records in the 61 operations done for contracted pelvis during the year shows that about one-half were definitely indicated. Less than half of the records have measurements to prove contraction! On the other hand, there is no way of determining the number of deliveries by craniotomy or the number of fractured skulls following brutal forceps deliveries in contracted pelvis in which abdominal section should have been performed.

During the past two decades the absolute indication for abdominal cesarean section has changed to include all pelvis whose conjugata vera is less than 7.5 cm. and all absolutely obstructing tumors. This group is small as only one woman in 6500 had such an obstructing tumor and only one in several thousand had a true conjugata less than 7.5 cm.

The borderline contractions in pelvis whose true conjugates are from 7.5 to 9.5 cm. are the majority of pelvic contractions. This group requires careful prenatal care, mature obstetric judgment, and skillful practice in delivery.

In no class of obstetric abnormalities is prenatal care of greater value than in the case of slightly contracted pelvis. Not only is pelvimetry of value but also internal pelvic palpation, the history of previous pregnancies, the apparent size and position of the fetus, and family and racial physical characteristics. One examination is not sufficient to decide the course of procedure and repeated examinations are necessary. In private practice and clinical cases which I see, I try to have my course of procedure in delivery determined before the patient goes into labor. A vacillating or indecisive policy is apt to be disastrous to mother or child.

Pelvic palpation is of great value in these contractions. The shape of the sacrum, the size and form of the promontory, the pars iliacus of the linea terminalis, and the spines, and tuberosities of the ischium are all of importance in anticipation of the progress of labor.

Family traits may be of value also. So the slight fragile mother is apt to give birth to a small child. Or the short, heavy mother is apt to give birth to the stocky, heavy type of child. Also, the heads of certain races as the Slav tend to have the brachycephalic type of head with small fontanelles and closed sutures which tend to prevent proper molding of the head. Other races, such as the Negro, have small heads, large fontanelles, wide, open sutures which help to mold the head even in a markedly contracted pelvis. The tendency to hypo- or hypermaturity, which frequently occurs in certain women, is of importance in judging the best method of delivery.

Almost any usual fetal head will engage in a pelvis whose conjugata vera is 9 cm. or more. For these at least a test of labor is available. Such test consists in permitting the woman to go through the first stage of labor with the necessary support. Then a trial of the second stage for a few hours will permit the head to mold in most cases. During this time only rectal examinations should be made. When one is able to push the head down from above so that the presenting part reaches the level of the spines, one is sure that engagement will occur. Frequently there is obstruction by the membranes; as soon as these rupture, the engagement is apt to follow.

In my private practice about 5 per cent of primiparae do not have the usual engagement when labor commences. If these are proved

TABLE V. VAGINAL HYSTEROTOMIES IN DETROIT IN 1925

INDICATION	CASES	MATERNAL DEATHS	INFANTILE DEATHS
Nephritic toxemia	6	0	4
Eclampsia	2	1	1
Placenta previa	1	0	1
Cardiac disease	1	1	0
Chorea gravidarum	1	0	1
Total	11	2	7



normal during pregnancy, I permit them to proceed as in the cases where engagement has occurred before the onset of labor. In the slightly contracted pelvis where engagement has not taken place before labor, I attend them closely, giving the necessary rest, sleep and care until engagement occurs.

One must be sure of diagnosis of position and presentation as such presentations as face, brow or breech are notoriously slow in descent. Also, lack of flexion of the head tends to slow engagement. A posterior vertex usually does not engage until labor is well advanced. Section is ill advised even in contracted pelvis without considering these conditions and the wonderful adaptability nature provides for the accommodation of such conditions.

During the years 1906-1924, there were 15,000 deliveries in the Montreal Maternity Hospital, of which 2000 (13.13 per cent) were classed as contracted. The operative procedure and results were as follows:

OPERATION		MATERNAL DEATHS	FETAL DEATHS
Forceps	186	2	16.6 per cent
Version	68	1	30.8 " "
Section	117	5	6.0 " "
Craniotomy	31	0	100.0 " "

This gives an incidence of one section in 128 deliveries with a maternal death rate for these of 4.2 per cent and infantile death rate of 6 per cent. It will be noted that in 2000 contracted pelvis only 117 had a section performed (5.8 per cent). This shows that only one woman out of every 17 with a definitely contracted pelvis required a section to be delivered.

E. Holland and Munro Kerr report on 4000 abdominal cesarean sections performed in England in ten years; 3374 of these were for contracted pelvis. The mortality figures were as follows:

1. Not in labor.....	1.6 per cent
2. Early in labor.....	1.8 per cent
3. Late in labor.....	10.7 per cent
4. After induction of labor .....	14.0 per cent
5. After attempt at forceps delivery.....	27.0 per cent

#### ABDOMINAL CESAREAN SECTION FOR ECLAMPSIA

In no condition is cesarean section so contraindicated as in eclampsia or the toxemias of late pregnancy. In this series there were twenty-six abdominal sections performed, resulting in maternal death in eleven instances (42.7 per cent) and five infantile deaths (19 per cent).

Dr. Holland reports a maternal death rate of 32 per cent in 196 sections performed for eclampsia in England and an infantile mor-

tality of 50 per cent. Stroganoff by his method has tended 2000 cases of eclampsia with a maternal mortality of 9.8 per cent and 18 per cent infant mortality.

During the past fifteen months, I have cared for thirty cases of eclampsia without a maternal death, and seven (23 per cent) infant deaths. These were all treated medically by means of sedatives, venesection, diet and elimination.

The woman suffering from eclampsia is a poor surgical risk because of her inferior physical condition, hydremia, and impaired circulation. The babies from eclamptics are frequently premature and also suffer from the same toxemia which affects the mother. Also placental hemorrhages produce a higher fetal mortality and morbidity. So infantile mortality is high, even after good care. Those infants born alive have a higher neonatal mortality. So the primary infantile mortality after cesarean section is no better than after medical care.

In this series more than one-half of the maternal deaths following abdominal cesarean section (55 per cent) occurred in cases of toxemia. Is the maternal hazard in this class worth the temptation of a rapid, easy delivery?

Cases in which the indication for abdominal cesarean section was unknown, were twenty-three, or 15 per cent of all. This classification was made to cover those cases in which records were missing or so incomplete as to prevent anyone from being sure of them. In this group four mothers (17 per cent) died and one infant (4 per cent). I wish to emphasize the fact that certain hospitals where sections are done are so negligent of their supervisory function over operations as to permit 15 per cent of all abdominal sections to be performed without a definite record of an indication for that procedure.

TABLE VI. PUERPERAL DEATHS AND RATES PER 1000 BIRTHS IN DETROIT

YEAR	TOTAL BIRTHS STILLBIRTHS INCLUDED	PUERPERAL DEATHS (134-141)	RATE PER 1000 BIRTHS	PUERPERAL SEPTICEMIA (137)	RATE PER 1000 BIRTHS	RATE* PER 1000 LIVING BIRTHS
1911	14,024	105	7.5	56	4.0	7.9
1912	15,087	85	8.3	40	2.5	5.6
1913	18,070	108	6.0	50	2.8	6.3
1914	20,150	116	5.8	56	2.8	6.1
1915	22,235	138	6.2	46	2.1	6.5
1916	25,504	166	6.5	83	3.3	6.9
1917	27,680	157	5.7	87	3.1	6.0
1918	28,491	206	7.2	71	2.5	7.6
1919	26,902	185	6.9	87	3.2	7.2
1920	29,132	254	7.7	96	3.3	9.2
1921	28,992	197	6.8	103	3.6	7.1
1922	27,290	187	6.9	82	3.0	7.2
1923	29,666	196	6.5	104	3.5	7.0
1924	32,166	216	6.7	106	3.3	7.1
1925	33,480	220	6.6	104	3.1	6.9

\*Puerperal death rate (all forms).

In the group of sections for placenta previa there were fourteen high abdominal sections with no maternal and one fetal death (7 per cent). This would be conclusive evidence that abdominal section is the best course to pursue in case of placenta previa were it not for the small number of cases recorded. Hitchman in his exhaustive monograph on placenta previa has collected 191 cases of placenta previa which had abdominal cesarean section performed with a maternal mortality of seven (3.6 per cent). He then shows a series of the same conditions treated by bag and version in which 532 women were delivered by this method with only ten maternal deaths (1.9 per cent). As the work was recent and the operators reputed to be skilled obstetricians, the conclusion must be admitted that bagging and version carries one-half the risk for the mother that abdominal section does.

The ease of performance of bagging and the small maternal and infantile risk seems to make it the preferable method of caring for placenta previa. There is a small group, however, in which the cervix is long and fibrous or markedly cicatrized from numerous previous lacerations. In this type the abdominal section is the preferable method because the slowness of dilatation of the cervix by the bag, together with the loss of blood and exhaustion are apt to prove fatal before version can be done.

There were twenty-seven cases in which abdominal section had been performed before (17.5 per cent). These fell into two groups: one in which there was a pelvic contraction; the other in which apparently no abnormality could be found. In thirteen cases (8 per cent) there was a pelvic contraction. There was one maternal death (7.7 per cent) and no infantile deaths in this group. The only course open to the obstetrician in this class is another section, which should be performed before labor commences. It would be foolhardy to tempt fate by testing a uterine scar when an obstruction is present.

In the other group in which a section was done because of a previous section performed without contraction being present, there were fourteen operations (9 per cent of all). Following these were three (21 per cent) infantile deaths and one (7 per cent) maternal death. The previous sections had been performed for placenta previa, ablatio placentae and tumors in four instances. Ten were unaccounted for, however. Apparently 6.5 per cent of the abdominal sections in this series were operated the first time without a good indication.

This group brings the phrase, "Once a section always a section," up for discussion. J. W. Williams has demonstrated that in a perfectly healed cesarean section, regeneration of muscle fibers takes place, and the histologic appearance of the scar is equal to the rest of the uterus. Defective scars and placental erosion of scars, however,

may cause rupture at the site of the previous section. DeLee reports the delivery of ten patients by the natural passages after cesarean section with good results.

The decision as to the course to follow should rest upon (a) the proportion of size of pelvis to fetus, (b) previous operator, (c) character of previous operation, (d) whether there was infection, (e) the apparent dilatability of the cervix.

It is generally accepted that the incidence of rupture of a scar is about 4 per cent, this being the result of Holland's investigation of 18 ruptures in 448 pregnancies at or near term. As 352 of this number were delivered by section, however, actually 96 were allowed to test the scar, and of these 18 ruptured, or 18.75 per cent of those tested by labor.

As DeLee states, however, "If the incidence of rupture of the scar of a previous section is lower than the mortality of cesarean section, it would seem logical to allow these patients, where there is no other indication for a cesarean operation, to go into labor and be delivered by the natural passages. It is of course important, however, that all such patients should be kept under the closest observation during pregnancy and delivered in a well equipped hospital under the personal attendance of an obstetrician qualified to do abdominal surgery."

Under the heading "miscellaneous," eight sections were performed for various pathologic conditions, such as cardiac decompensation, etc. This class could be almost eliminated were all patients given proper prenatal care from the onset of pregnancy through to delivery. Also, skillful obstetric care combined with good medical supervision can usually carry these through labor by delivery through the natural passages.

There were five abdominal sections performed because of obstructing tumors with one maternal death (20 per cent) and no infantile deaths. The majority of obstructing tumors are maternal, either uterine or ovarian. Most of these can be pushed out of the pelvis so as to permit a natural birth. Even such obstructions as adherent ovarian cystomata in the pelvis may be removed by aspiration through the vagina during labor in order to open the natural route for delivery.

In this entire series there was no section performed for an obstructing fetal tumor. Such fetal tumors are of such character as to be fatal to the infant, even if born alive. So, a section for such indication is inadvisable as it subjects the mother to a great risk when a living child is impossible.

In connection with fetal abnormalities, it is important to stress the necessity of fetal radiograms before section is performed. I have

seen four cases of fatal fetal malformations in which section had been considered. It would seem only fair to the expectant mother to be sure that she has not only a living child but a physically normal one before section is decided on.

Section was performed in three instances for ablatio placentae with no maternal and two fetal deaths. At present we are just beginning to realize the frequency of this condition which practically always is caused by toxemia of late pregnancy. Section is the only procedure which can save the maternal life in the severe cases in which there are extensive intramuscular hemorrhages, and little or no uterine contractility. Where placental separation is partial, there is a chance to save the infantile life by section, but not through the natural passages.

The contraindications are probably more important than the indications, as the mortality rates result mostly from performance of abdominal section when it should not have been performed.

(1) The presence of a dead fetus in the uterus is an absolute contraindication, unless there is such disproportion between fetus and pelvis that delivery through the natural birth passage would be impossible. (2) The presence of congenital fetal malformations which would be fatal at or shortly after birth are contraindications for a section. In cases of doubt a radiogram is essential. (3) Section for a premature fetus which is not viable, even though alive at the time of operation, is inadvisable. This is especially true of twin pregnancies in which both die shortly after delivery due to prematurity.

On the part of the mother contraindications are (1) toxemias, which are better cared for medically. (2) After prolonged labor, as Holland and Kerr have shown a maternal mortality of over 10 per cent in this class. (3) After induction of labor where the mortality of Holland and Kerr was 14 per cent. (4) After attempt at forceps delivery where the same authors showed a mortality of 27 per cent. (5) During severe intrapartum infection, which are 50 per cent fatal after section.

In considering the problem of abdominal cesarean section in Detroit, these facts must be reviewed: first, that the death rate in the city from childbirth has not materially decreased in years; second, that the rate of cesarean sections is too high; third, that the death rate from sections performed is too high.

The puerperal death rate for 1925 in Detroit was 6.6 per 1000 births. This was only 1 per 1000 less than the average for fifteen years preceding. This means that during the past year only three less maternal deaths occurred from childbirth than would have occurred had the rate for the other fifteen years prevailed. This proves that the

art of obstetries has not advanced materially in that period of time in this city.

The fact that cesarean section has been performed for almost every pathologic condition occurring in pregnancy shows how intimately this operation is associated with obstetries. Not until the standards of obstetric practice are so raised as to materially reduce the puerperal death rate, will an improvement come in the incidence and mortality resulting from abdominal cesarean section.

While it is true that other places and hospitals report a high incidence of cesarean sections, a number of hospitals report low rates even today. George Clark Mosher reports the rate of abdominal sections in the Swedish Hospital, Minneapolis, as 1 to 417, and Burnside Hospital, Toronto, as 1 to 872. The rate of 1 to 217, which prevails for Detroit, is too high in comparison with these hospitals, which receive a relatively higher proportion of abnormal cases than is found in an entire city.

One usually thinks of a maternal mortality of 2 per cent. DeLee reports 145 low sections with only one maternal and two fetal deaths. Herbert Speneer reports four maternal deaths in 120 high abdominal sections with five fetal deaths. Bar reports 97 sections and DePorceta 112 without a maternal death. We should not consider these figures as much as those which prevail for this city now, 13 per cent mortality for mothers and 11 per cent for infants. We should also remember that 10 per cent of all women who died from childbirth died after an abdominal cesarean section. We should also have firmly fixed in our minds that the mortality danger to the expectant mother is 20 times as great in this city as is a delivery through the natural passage. The puerperal mortality rate for 1925 for the city was 6.6 per 1000 deliveries, while that following abdominal section was 130 per 1000!

As all cesarean sections are performed in hospitals, it would seem to be feasible to control the performance of this operation by hospital authorities. As only two of the hospitals in the city are "closed," the majority which are "open" are used by the major part of the medical profession for operative obstetric work. No section should be permitted unless with the approval of an obstetric committee or consultant. Men of mature obstetric judgment, firm will power, and a strong obstetric conscience, should be appointed by each hospital to supervise not only sections but all major obstetric operations. In this way not only could unnecessary cesarean sections be eliminated, but the elements of danger and contraindications could be avoided. So the danger of operating late in labor, which Holland and Kerr have pointed out, could be used in the judgment of the neglected cases.

It should be the duty of the smaller hospitals to secure at least one competent obstetrician to act as advisor and consultant in all abnormal cases.

Unfortunately the public is so educated to operative interference in labor that it readily assents to sections which are not indicated. Even intelligent people request abdominal sections in order to forego the stress of labor, little realizing the possible danger of such procedure, and not understanding that such an operation will limit their future families.

Knowing that abdominal cesarean section in Detroit is a procedure fraught with danger to mother and child, we, as a profession, should educate the public to the dangers of this operation. We should so regulate deliveries in our hospitals that this operation could only be performed after a proper consultation by a qualified obstetrician or group of obstetricians. Only those skilled in abdominal surgery should be permitted to operate, and only those who understand the dangers and complications following this operation should be permitted to care for them.

#### SUMMARY

A maternal mortality of 13 per cent and infantile mortality of 11 per cent following abdominal cesarean section is too high. These bad results follow the indiscriminate performance of abdominal section by surgeons who do not understand or follow the indications, or avoid the contraindications for this procedure.

Especially in eclampsia is abdominal section to be avoided. In this series a maternal death rate of over 42 per cent is appallingly high when one knows that medical care for this condition can reduce maternal mortality to less than 5 per cent.

A summary of the records for abdominal section in Detroit shows that this procedure is followed too frequently, without proper consultation and without the knowledge of the dangers this operation entails upon mother and child.

497 GRAND BOULEVARD.

## PURPURA HEMORRHAGICA COMPLICATING PREGNANCY— REPORT OF A CASE

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*(From the University Hospitals of Cleveland)*

THE infrequency of purpura hemorrhagica as a complication of pregnancy warrants the report of a case which first came under observation in the prenatal clinic. That this hemorrhagic diathesis appears in obstetrics as a complication of pregnancy in a form indistinguishable from that described as idiopathic purpura hemorrhagica or, as it recently has been termed, thrombopenic purpura, has been reviewed and reported by Rushmore and others. Rushmore found record of only some forty-odd cases since 1867. Cases in which purpura and the liability to hemorrhage had first appeared during a pregnancy are comparatively infrequent. Although our case corresponded very closely to others associated with pregnancy,—namely, the essential features of diminution of the blood platelets, spontaneous bleeding from the mucous membranes, purpuric skin lesions, delayed coagulation time, increased bleeding time, nonretractility of the clot, positive tourniquet test, and anemia, etc.,—it did not retrogress soon after labor.

The clinical course was that described in most of the other cases associated with pregnancy. The patient was an American, thirty years old, with no history of familial blood dyscrasias. Except for peritonitis following an abortion three years before this pregnancy there had been no serious illness. There had been a previous full term pregnancy resulting in a living child. At her first labor, eighteen months previously, there had been a profuse postpartum hemorrhage but no accompanying purpura. She occasionally had some temperature before the present delivery, crops of petechiae and hemorrhages from the mucous membranes of the mouth. Her blood destruction was progressive. After delivery she had a septic temperature with a profuse lochia. Splenectomy was followed by a lethal exodus. An autopsy was performed.

The patient presented herself at the prenatal clinic July 8, 1925, because of black and blue spots over her body. She gave the following history: Age 30, para ii. First baby which was born March 22, 1924 by forceps, weighed eight and one-half pounds and was followed by a severe postpartum hemorrhage because of which the mother was packed and given saline subcutaneously. She had an uneventful rapid recovery. The first day of her last menstrual period was Jan. 13, 1925; she had some nausea and vomiting during the first two to three months, some edema of the feet and occasional headaches. She thought she felt quickening in June. She had first noticed the appearance of the discolored areas during the fourth month of her pregnancy. There were no subjective symptoms but as her pregnancy progressed the purpuric spots increased in number and size, appearing chiefly over the body and extremities. At first the patient thought them to be due to trauma



because any injury seemed to produce a black and blue spot quite easily. There was no bleeding from the nose but she had noticed some bleeding at the gums. As far as could be determined there had been no melena, hematuria, or hematemesis. Examination at that time revealed the following: the uterus was about the size of a five and one-half months' pregnancy and the fetal heart was 144. The measurements were 20, 25, 27. She had slight edema of the feet and ecchymotic areas over arms and legs. Her teeth were poorly kept and carious. Her blood pressure was 100/58 and the blood Wassermann was negative.

Her second visit to the prenatal clinic was two weeks later at which time the following notes were made: No headache, dizziness, nausea, or vomiting. No edema. Purpuric spots on abdomen and legs. Fundus three fingers above umbilicus, fetal heart 156 in right lower quadrant. The urine showed no albumin. Blood pressure, 110/58. She was sent to Lakeside Hospital for further study and treatment.

Examination on her admission to Lakeside Hospital showed a well developed young woman with petechial hemorrhages and areas of ecchymosis, scattered over the legs and anterior surface of the body, varying in color from red to a dark blue, the largest being from 2 to 5 cm. in diameter. There were also several petechiae on the hard palate and the mucous membrane of the mouth. The heart and lungs were normal. The abdomen was protuberant, the uterus rising midway between the umbilicus and the ensiform. Movements of the child were visible. The spleen could not be felt. No vaginal examination was done. There was slight tenderness on deep pressure over both tibiae. There was no adenopathy.

The blood at this time showed 1,936,000 R.B.C. and 2,350 W.B.C., 25,000 platelets, hemoglobin 36 per cent Sahli. By centrifuge method the red cells by volume corresponded to 2,095,000 cells. Differential count on the blood smear showed 51 per cent polymorphonuclears, 16 per cent large mononuclears, 32 per cent small mononuclears and 1 per cent transitionals. There were no nucleated red cells but there was quite marked anisocytosis. The bleeding time was 4.5 minutes, the clotting time was 4 minutes. The blood calcium was 9.6 mg. per 100 c.c. The blood culture was negative as was the Wassermann reaction. The urine was normal.

Shortly after admission the patient was given a transfusion of 600 c.c. of unmodified blood. The blood, after transfusion, showed 36,000 platelets, 2,268,000 R.B.C., and a hemoglobin of 50 per cent. It was the intention to give the patient several more transfusions but after being in the hospital for about ten days she left contrary to advice.

On her next visit to the prenatal dispensary four weeks later she was very weak and had generalized purpura. She had no headache, dizziness, edema or vomiting. The fundus was three fingers below the ensiform. The fetal heart was 140 in the right lower quadrant; the back on the right, small parts to the left, breech in the fundus and head floating. The urine had no albumin. Her blood pressure was 100/50.

Twelve days later our prenatal nurse visited at her home and found that she was weaker and was bleeding from her gums. Seven days after this she entered Lakeside Hospital on account of increased bleeding from the gums, this being about six weeks after her previous discharge. Examination on this admission showed many bright red petechiae over the abdomen and breasts, none over the posterior surface of the body. Scattered over the legs and upper arms were many discolorations. The skin in general had a distinct pallor and a suggestive lemon-yellow tint. The gums were bleeding and petechiae were present over the mucous membrane of the mouth. The blood findings showed essentially the same features as before: 1,400,000 R.B.C., hemoglobin 30 per cent Sahli. Platelets were 40,000 to 50,000. Red cells by volume were calculated at 1,800,000. The blood plasma was

not icteric. The clotting time by the capillary tube method was six minutes. No new crops of petechiae appeared but when compression of the arm was made by tourniquet a large number appeared below the point of compression. She was again transfused. Because of the proximity of term and the appearance of recurring uterine contractions the patient was transferred to the Maternity service for delivery.

The patient was admitted to Maternity Hospital October 9, 1925, with temperature 38.4° C., pulse 100, respiration 24. Her blood pressure was 116/60. Her temperature came down to normal on the following day and remained so for five days. On the fourth day she noticed pain in the region of the right calf but there was no evidence of a phlebitis. She started in labor at 2:00 P.M. (October 14, 1925.) Uterine contractions were every 2 to 3 minutes. There was no more than normal show. The cervix was fully dilated in twenty minutes. The presentation was an L. O. A. On account of her general physical condition a prophylactic low midforceps was easily done to shorten the second stage. The third stage was completed in five minutes. There was no more bleeding than normal although on account of her previous history and her present blood dyscrasia this was looked for. The placenta was double. No vaginals were done. A catheterized urine specimen showed a trace of albumin, many R. B. C., and numerous granular casts.

The baby, a male, needed no resuscitation. He weighed 3320 gm. and was apparently normal. After twelve hours it was put to breast every four hours until the mother's condition did not permit, when it was put on an artificial feeding. The cord dropped off on the third day. The stools were normal. The weight on transfer to the pediatric service was 3185 gm. The child has been under more or less continuous observation up to the present time and it is reported that it has never shown any abnormality, has gained in weight constantly and at eight months weighed 8530 gm.

The lochia was profuse and she had an elevation in temperature the day after delivery. Temperature 39.2° C., pulse 96, respiration, 22. She expelled several clots of blood each about 4 cm. in diameter on each of the next four days. She began a septic type of temperature on the third day postpartum and continued this. On the sixth day postpartum she had a slightly offensive lochia. On the fourth and seventh day postpartum respectively, the blood pressure was 122/72 and 106/58. The last two days on the obstetric service the patient's vision was not clear. She became very restless and complained of blindness at times. She had been given fluid extract of ergot to control the lochia.

The patient was returned to Lakeside on the seventh day postpartum having a leucocyte count of 3,500, R. B. C. 980,000 and hemoglobin of 10 per cent. There was no increase of the purpura and the oozing from the gums continued. Examination showed considerable emaciation—the patient having lost 55 pounds in two and one-half months. The right calf was very tender and there was increased heat and some superficial induration. There was also tenderness over the popliteal space but none over the femoral. There were no further new features about her condition except that her temperature remained high and that her anemia was marked. The eyegrounds showed the retinae to be very edematous, and everywhere there were large and small retinal hemorrhages. Transfusions were again given her and her blood was increased to a count of 2,780,000 R. B. C., and the hemoglobin to 50 per cent. The blood studies otherwise were as before.

The advisability of doing a splenectomy was considered in view of the fact that her condition was always retrogressive and operation was decided upon but approached with no great degree of confidence. It was the general feeling, however, that drastic measures would have to be resorted to to produce a cessation of her

hemorrhages. Splenectomy was done, a transfusion immediately preceding the operation. The spleen was found not to be enlarged. Cultures were made from the spleen under careful asepsis within five minutes after its removal and a short chain streptococcus was grown. A blood culture taken just before the operation gave no growth.

Her postoperative condition remained fairly good until the second day when she suddenly became very restless and breathing became difficult for her and she died.

Why the patient failed to recover after the splenectomy is of speculative interest. Transfusion was done immediately before operation but not after operation because of the apparently good condition of the patient and the relatively good blood findings after operation.

The autopsy showed generalized subcutaneous hemorrhages. There was edema, and congestion of the brain. There was a localized chronic fibrous pleuritis, congestion and edema of the lungs with multiple hemorrhages through the lungs. There were petechial hemorrhages in the epicardium and anemia of the heart muscle and mild atherosclerosis of the aorta. There was an acute parenchymatous degeneration of the kidney, petechial hemorrhages of the kidney surfaces and bilateral hemonephrosis, and petechial hemorrhages in the ureters. There were also petechial hemorrhages in the gastrointestinal tract. There was an acute necrotic endometritis.

61 FORREST AVENUE.

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## URINARY DISTURBANCES FOLLOWING GYNECOLOGIC OPERATIONS\*

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MY PURPOSE in presenting this paper is to call attention to the fact that surgical operations in the female pelvis are often followed by urinary symptoms, some mild and amenable to treatment, others severe and frequently intractable. Although the annoyances for which a particular operation was done may be relieved and the patient cured, she may present herself shortly thereafter with a new complaint which manifests itself as a urinary disturbance. Careful investigation of many such cases has revealed involvement of either the bladder or ureter or both in a large percentage. The symptoms complained of by these patients varied from a mild dysuria or frequency, to urgency, strangury and vesical tenesmus. In several instances the macroscopic appearance of the urine suggested hematuria, pyuria or bacteriuria. After questioning these women it was found that they usually traced their disorders back to a previous surgical operation, to an abortion, or to an operative delivery.

My report includes a study of one hundred and forty-six patients who had been operated on for various pelvic disorders and presented

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themselves to the female cystoscopic clinic on the service of Dr. Walter T. Dannreuther at the New York Post-Graduate Hospital. Our female cystoscopic clinics are included in the Department of Gynecology. All of our own cases operated upon at the hospital are cystoscoped before operation, the kidneys and ureters being investigated if necessary. In the cystoscopic clinic, however, we also receive women with urinary disorders from sources outside of our own institution and the observations in my report are based largely upon this material. The operations preceding the urologic complaints embrace supravaginal and complete abdominal hysterectomy, ovarian cystectomy, interposition operation for prolapse and cystocele, intra-cervical radium applications and cesarean section. I have also found it necessary to refer to the etiologic importance of endocervicitis and abortions. This series of one hundred and forty-six cases is made up as follows:

- Thirty-four presented themselves with urologic symptoms after hysterectomy.
- Eight after interposition operation.
- Six after cesarean section.
- Two after the use of radium in the uterus.
- Nine after large ovarian cysts.
- Six after high amputation of the cervix.
- Twenty-seven after abortion.
- Forty after endocervicitis.
- Fourteen after salpingectomy or oophorectomy or both.

It is probable that the observations I have made have come to your attention before but their relative frequency prompted me to submit the results of a detailed study for the purpose of stressing some of the etiologic factors concerned in these urinary disturbances.

The anatomic relations of the bladder as well as those of the lower third of the ureter to adjacent organs are of special importance and there are several characteristics of a female bladder to be kept in mind. The minimum, maximum and average capacities are less than that of the male, being 200, 1000 and 650 c.c., respectively. The wall of the bladder of the female is thinner than that of the male. When relaxed and empty the vertex drops down close to the base. If seen on sagittal section it is "Y" shaped, the stem of the "Y" being the urethra. This is chiefly due to the fact that the fundus uteri rests on the bladder when it is empty. The longer anterior arm rests against the symphysis and the shorter posterior arm against the vagina and cervix. As the bladder distends, the vertex is gradually lifted up from the base, which expands downwards and backwards, while the lateral walls stretch towards the pelvic walls in each side. Because of the limited space in the bony pelvis the transverse diameter reaches its maximum sooner than the other measurements. The upper half, and part of the posterior portion of the bladder are covered with peritoneum

and as the distention progresses, the vertex rises over the symphysis and carries the line of peritoneal reflexion upward. This brings the extraperitoneal portion of the bladder up to the suprapubic region. When fully distended, the bladder is ovoid, with the long axis pointing toward the umbilicus. When excessively dilated, the vertex may reach the level of the umbilicus; the peritoneal reflexion is then about 10 cm. above the symphysis. Although the peritoneal covering is limited to the upper surface, it dips down slightly on the sides and behind, thus forming a fossa on each side between the bladder and pelvic wall, round ligament and uterus. These lateral paravesical fossae are crescent shaped, and traversed by the converging obliterated hypogastric arteries. The extraperitoneal lower surface is supported by the rectovesical fascia and pubic bones with loose areolar tissues intervening. The trigone rests against the upper end of the vagina and cervix. The meshed areolar tissue found everywhere at the base of the bladder facilitates its mobility and is most marked in the prevesical area; the space of Retzius.

Beginning at the renal pelvis, each ureter runs downward, slightly median and forward, across the psoas muscle, where it passes under the ovarian vessels. The right ureter passes nearer the vena cava than the left does the aorta. The upper portion is known as the abdominal part and rarely concerns the gynecologist. After crossing the iliac vessels the ureters become pelvic and here they lie about 6 cm. apart, approximating as they approach the bladder. After crossing the iliac vessels they curve backward and outward following the contour of the pelvis. They pass in front of all the large vessels, reaching their most lateral point as they cross the obliterated hypogastric arteries opposite the ischial spine. Now running downward and slightly forward and mesially, they pass beneath the uterine and superior and middle vesical arteries and skirt the cervix and vaginal fornix until they reach the trigone of the bladder. Approaching it from each side, they obliquely perforate the bladder wall for about 2 cm. until they open on the mucous membrane about 3 cm. apart. The ureters are covered in front by peritoneum, except when passing under the mesentery or the extraperitoneal surface of the terminal ileum on the right side, and the sigmoid flexure on the left. The ureter is about 1 cm. shorter in the female than in the male usually spanning 28 cm. on the right, and 29 cm. on the left side. The diameter is about 5 mm. and the lumen is star-shaped because of the muscular folds projecting into it. The caliber is not uniform throughout, being relatively constricted and dilated at several points.

In a consideration of the bladder and ureteric involvements concerned in the causation of postoperative urinary disorders, it seems desirable to discuss the more important operative procedures individually:

*Supravaginal Hysterectomy.*—After the upper portion of the broad ligaments are divided, the vesicouterine fold of peritoneum is lifted from in front of the uterus and cut across. The bladder is then pushed off the uterus with either the gauze-covered finger or gauze held in sponge forceps. If this particular step is not carried out with extreme gentleness and care there may be a distinct traumatism to the bladder peritoneum and wall. The separation of bladder from the anterior surface of the uterus is usually an easy matter if the peritoneum is divided within the area of loose attachment, which extends up on the anterior surface of the uterus considerably beyond the vesicovaginal fold but annoying difficulty in this separation is caused if the cut across the peritoneum is made above this loose area. The dissection should always be continued down to the upper part of the cervix and then still lower if any tumor nodule lies in the cervix. Failure to recognize and remove a tumor nodule in the cervical tissue has been responsible for two of my cases of intractable cystitis, and encroachment on the bladder from subsequent enlargement of the tumor necessitated reoperation. I have cystoscoped patients after supravaginal hysterectomy who have been unable to void voluntarily and found patches of congestion and hemorrhage corresponding to the area of bladder separation from the uterus. This region revealed evidences of traumatism to the bladder wall instead of a clean dissection or separation. In the later stages a distinct cystitis may develop with the coincident urinary symptoms.

*Complete Hysterectomy.*—In this procedure there is a further separation of the bladder, the separation being carried sufficiently downward to expose the upper part of the vagina as well as the cervix. Before or after the uterine vessels are divided, the bladder is pushed well off the cervix and broad ligaments laterally. This is essential to keep the bladder and lower part of the ureters out of the way when the forceps and ligatures are applied to the broad ligaments subsequently. To determine whether or not the separation of the bladder downward and laterally has been carried far enough, place the thumb in front and the fingers behind the vagina, and locate the lower margin of the cervix by palpation. This procedure will determine the amount of bladder separation required. Again it is well to emphasize the necessity for gentleness and care in mobilization of the bladder and extreme caution in the use of clamps. The possibility of damaging the ureters when dividing the tissues lateral to the cervix should not be forgotten. Crossen recommends the employment of short instead of long bites with the forceps, as the ligatures are then more easily applied. Two or three bites on each side are usually required to free the cervix down to the vaginal wall. Careful palpation of the cervix will decide whether or not the division has been carried far enough. To

prevent slipping of the clamps, strong pressure forceps, preferably toothed, should be used.

*Ovarian Cysts.*—These include the usual and unusual types of cysts, i.e., pseudomucinous, which may be the ordinary variety, or the type that is densely adherent, the dermoid, and the papillary cyst. At the same time we may also consider the solid and the malignant tumor of the ovary. In all such cases it is prudent to remember that a large incision gives a better exposure of the tumor and adjacent structures which are often adherent to the cyst or tumor. The bladder is often drawn up by the tumor, and it is always wise to incise the peritoneum high up. After the bladder has been identified, the peritoneum can be incised downward. A small incision or opening the peritoneum too low may cause accidental wounding of the bladder.

*Parovarian Cysts.*—The simple parovarian cyst grows between the layers of the broad ligament and is confined within these peritoneal layers. In its early stages it displaces the uterus and bladder and thus causes pressure symptoms. The enucleation of this tumor leaves a large cavity in the broad ligament into which considerable post-operative oozing may occur, if strict attention is not given to hemostasis. Hemostasis is best obtained by securely ligating the pedicle, and approximating the sides of the cavity with sutures, the operator should always bear in mind the location of the ureters in placing these sutures, otherwise the ureters may be inadvertently included in the sutures. In this type of cyst, it is a good plan to pass catheters into both ureters and leave them in situ throughout the operation. This extra precaution will avoid the disaster of tying off one or both ureters.

*Transposition of the Uterus.*—Subvesical interposition of the uterus for cystocele alone or for combined cystocele and uterine procidentia has resulted in postoperative vesical complications in this series. I have had the opportunity of studying eight cases of bladder disturbance following this operation. Upon cystoscopic examination, some bladder distortion with an accompanying cystitis was evident. At this time I wish to refer to some interesting observations made by Daniel R. Ayres, in a paper published in 1917, calling attention to the deleterious after-results of this operation. They refer particularly to the effects on the bladder, and cases were reported suffering from cystitis, stone formation, and vesical tenesmus. In a later paper published by Johnson of Boston, thirty-two cases were reported, where by modifications of technic, these bladder sequelae were claimed to have been overcome. However, I cannot agree with his conclusions. The cystoscopic picture in my cases invariably revealed an elevation of the base of the bladder, with sacculations on either side. These pockets were the sites for an accumulation of residual urine, which underwent decomposition, and resulted in a localized cystitis. I be-

lieve that a uterus larger than a six weeks' pregnancy is not adaptable for transposition. Such uteri are often found in cases of chronic metritis, subinvolution, and where submucous and intramural fibroids exist. Preliminary reduction in size by removal of fibroids is not advisable, and hysterectomy is the preferable procedure. Reduction of an enlarged uterus by the excision of part of the uterine wall together with the endometrium, is not a procedure favored by most operators. Culbertson has reported a fatal result in one case in which he resorted to this method.

In cystocele and prolapse of the uterus, the fascia is usually weakened and thinned out, and if we transpose an enlarged uterus, the weight of the uterus will tend to produce a recurrence and carry the bladder with it. A resected uterus is a traumatized uterus and how this uterus will behave after operation is entirely speculative, because of the possibility of infection, which sometimes follows when the endometrial cavity is opened. Reduction of the size of the uterus by resection has an extremely limited application, and is feasible only in those cases in which, after the vaginal delivery of the uterus one or more subserous or pedunculated fibroids are discovered. In one of my cases, the bladder had a capacity of 1000 c.c. and when fully distended with boric acid solution, the top of the bladder was at the level of the umbilicus. One can readily see that with such a large bladder, sacculation is inevitable. I believe that every bladder should be carefully studied with reference to its size and capacity as well as for evidence of pathology, before this operation is performed. This implies a careful cystoscopic examination, a culture of urine, and sometimes even a cystogram. I am fully convinced that cases of proidentia associated with cystocele have some coincident cystitis and that a bladder so affected should be given a series of bladder irrigations and instillations before an interposition operation is done. These precautionary measures will promote postoperative convalescence and lessen postoperative morbidity. I have recently visited several large gynecologic clinics and discussed this matter with many representative gynecologists. Most of them seem to feel that this operation should only be done in carefully selected cases, and I believe that they are resorting to this method of curing proidentia and cystocele much less often than they have in the past.

*Cesarean Section.*—While I do not intend to delve into the realm of obstetrics, it is necessary to mention that six patients in these series presented themselves with bladder symptoms following delivery by cesarean section. On cystoscopic examination, one case showed marked distortion of the bladder wall; another, a herniation of the abdominal wall at the site of the abdominal incision, with a false sacculation of the bladder, and the other cases showed an intractable cystitis. One of these cases of cystitis dated back six years to a



cesarean section, when her first and only child was born. All of these cases had scars below the umbilicus, but I was unable to ascertain definitely the type of operation performed. However, it has been my experience that the low cervical cesarean section is the technic most likely to be followed by bladder disturbances. The bladder may be injured as a direct result of either hasty separation of the bladder from the lower uterine segment, or direct traumatism by cutting instruments. There is really no need for unusual haste in carrying out the several steps of cesarean section. The only time when haste is necessary is between incising the uterus and extracting the child. This period may be one of danger to the child, especially in those cases in which extensive separation of the placenta is necessary before the hand can be introduced into the uterine cavity. The bladder is probably jeopardized more in the extraperitoneal than the high cesarean section. In these cases it is sometimes wise to distend the bladder with sterile salt solution, or boric acid, before the abdomen is opened, so that it may be easily identified. Since drainage is occasionally instituted in this type of cesarean section, postoperative adhesions may follow. This increases the likelihood of bladder involvement later on. The ideal cesarean section is an elective operation. When done as an emergency procedure, careful technic should not be sacrificed for haste.

I am personally opposed to postoperative routine catheterization in the first thirty hours after cesarean section, as the average amount of urine collected during the first twenty-four hours is usually less than twenty-five ounces. In the majority of cases the patient will be able to void spontaneously, if measures are used to encourage voluntary urination. But if she fails to void despite these measures, she should be catheterized. When repeated catheterization is necessary, she should be given a urinary antiseptic. As an added precaution against bladder infection I would recommend irrigation of the bladder once or twice daily with a mild antiseptic solution, such as boric acid 2 per cent or mercury oxycyanide 1:8000. Cystitis will rarely develop in a case so treated. If the patient cannot void at all, she should be catheterized every eight hours. In the few cases in which bladder irritability does appear, I would recommend the instillation of two ounces of a 5 per cent neosilvol solution once a day. This will usually relieve it promptly. It is inadvisable to discontinue catheterization as soon as spontaneous urination is reestablished, because the bladder may not empty itself completely. The catheter should be used once a day, for two or three days, because a residual urine may remain after voiding. This predisposes to infection and may be responsible for a subsequent cystitis. The course of procedure I have outlined refers only to those cases in which catheterization for several days has been imperative.

*Bladder Involvement Following Abortion and Endocervicitis.*—While not strictly pertinent to the subject, I do not think this paper would be complete without some reference to two conditions that have been responsible for bladder and sometimes ureter involvements in many cases: septic abortion and chronic endocervicitis. In these cases the bladder or the ureter becomes involved by extension of infection through the lymphatics or by contiguous inflammation. A survey of the lymphatics of the uterus, ureter and bladder reveals the intimate communication between these organs through their lymphatic chains. The lymphatics of the posterior bladder wall drain into the internal iliac, hypogastric and sacral glands. The lymphatics of the uterus are divided into two groups: those of the body join those of the tube and ovary and drain into the lumbar glands, while those of the cervix join those of the upper vagina and drain into the hypogastric, sacral and superior iliac glands. The intimate lymphatic relation of the uterus and bladder is obvious and a frank infection of the cervix can be readily transmitted to the bladder and ureter. I have seen many cases of bladder disturbance associated with infection of the cervix. Most of them, whenever treatment was directed to the cervix and the endocervicitis lessened, the bladder symptoms improved or disappeared. However, some of these patients returned with a recrudescence of bladder symptoms at a later date, and speculum examination of the cervix revealed a renewed activity of the cervicitis. In such cases a tracheloplastic operation was done, and in each instance the bladder condition was permanently relieved by the operative procedure. In cases of bladder involvement following septic abortion, cystoscopic examination disclosed an acute cystitis of moderate severity, probably as a result of direct lymphatic extension from a metritis or from a contiguous pelvic cellulitis or parametritis. After the use of remedial measure to reduce pelvic inflammation and engorgement (such as rest, ice bag and enemata, and later pelvic depletion by vaginal packing), the bladder became normal as the pelvic inflammation subsided. However, the bladder itself was treated locally.

*Bladder Involvement Following the Use of Radium in the Uterus.*—Two patients in this series presented themselves with bladder involvement following the use of radium. One received radium in the cervix for what was diagnosed as a carcinoma but no biopsy examination was made in this case. The other patient a young unmarried girl had been given radium for intermittent uterine bleeding of unknown origin. In both cases, cystoscopic examination disclosed the following findings: an irregular patch of ulceration on the floor of the bladder, behind the trigone in the median line. This patch was elevated and indurated. In the case that received radium for carcinoma of the cervix, the margin of the ulceration showed distinct edema, with hyperplastic tissue covering the ulcer and simulating a carcinoma. By

repeated washings of the bladder I secured several pieces of tissue for microscopic examination. They revealed no evidence of carcinoma. It is now four years since the radium treatment and she is in perfect health, except for an occasional return of bladder symptoms. I have had an opportunity to study bladder involvements following radiation of the cervix in several other cases, but in these the reaction was mild and rapidly responded to treatment.

It might be worth while to refer to the technic of radium application used on this service at the Post-Graduate Hospital. Briefly, this is as follows: Every patient upon whom radium is to be used is subjected to a thorough physical examination. The condition of the kidneys, bladder, and rectum is carefully investigated. Physiologic functions are carefully determined before the radium is used. Intensive radium is not applied to the uterus unless we are sure that the excretory organs of elimination are capable of functioning reasonably well during the period of destruction of the neoplasm. Cystoscopy and proscopy are useful, even though the patient is free from bladder or rectal symptoms, to make sure there is no unrecognized bladder or rectal involvement. Renal function is checked by means of an indigo-carminic function test, and the catheterized urine from each kidney carefully examined.

The external genitals are prepared as for any major gynecologic operation (parts shaved and iodized). As a rule the cervix is not dilated before the insertion of radium. A special long and slender carrier that slips easily into the cervix is used. Under no circumstances is the Goodell or any other branched dilator employed. In the few instances in which dilatation is necessary, it is accomplished by the gentle introduction of bougies of increasing caliber.

After the radium has been deposited into the cervix or corpus uteri, and its position fixed, the bladder is emptied and kept empty by the insertion of a specially designed, right-angled Pezzer catheter. The vesical and rectal areas are firmly packed off with iodoform moistened gauze. The iodoform gauze is never used dry as it causes a sensation of vaginal irritation and burning. One strip of gauze is introduced into the posterior fornix and another into the anterior fornix. Adjacent viscera should not come within two cm. of a radium applicator. Additional gauze is packed in, so that the entire uterus is pushed up out of the pelvis as far as possible. It is unwise to use radium for benign conditions just before the menstrual period as the bladder often participates in the premenstrual congestion.

*Postoperative Care of the Bladder.*—The protection of the urinary tract constitutes one of the most important features of postoperative care following surgery in the female pelvis. Following an abdominal section in which the bladder has been mobilized or sutured, as in hysterectomy, or a plastic operation, the bladder contents should be

inspected before the patient leaves the operating table. This is accomplished by inserting a catheter and inspecting the urine for macroscopic blood. A nontraumatized bladder lessens the probability of postoperative morbidity and bladder disturbance. It has been my experience that after abdominal section, most patients have been able to void spontaneously. A small percentage must be catheterized. According to Curtis, 60 per cent of his patients, subjected to major gynecologic operations, required no catheterization, 11 per cent required it once, 5 per cent required it twice, and 17 per cent required it three or more times. If a patient does not void spontaneously after operation, measures may be instituted to induce and stimulate urination. It is encouraged by local hot applications, by steaming hot water poured into the bed pan, by external douching with hot water, and other autosuggestive measures. Sometimes an application of a stimulating substance to the meatus, such as a drop of spirits of camphor is helpful. Diuresis may also be encouraged by the copious drinking of hot water, if all vomiting has ceased. I personally favor filling the peritoneal cavity with normal saline solution, sometimes using a quart, before closure of the abdominal wound, as a matter of routine. This usually accomplishes the following:

- (a) Shock is usually minimized.
- (b) The loss of fluid from incidental bleeding is promptly made up.
- (c) Excretion via the kidneys is prompt in most cases.

Saline enemata as well as the Murphy drip are also very useful in promoting diuresis. The use of pituitrin, given in 0.55 c.c. doses by hypodermic injection, and repeated in three hours if necessary, is of value in those cases that have failed to void spontaneously. This procedure has served me well in many instances. Catheterization can be delayed for every twelve hours, while attempts at promoting urination are made every eight hours.

Since it is more difficult for a patient to void while lying down, I have tried having the nurse support the patient in a sitting or reclining position on the bed pan with considerable success. When the patient once regains her ability to void, she usually continues the desire regardless of position. Sometimes we see a patient who is unable to void spontaneously so long as she is confined to bed, but does so promptly on arising. The temperament of the patient is also a factor, as urinary difficulties are often associated with a neurosis.

The first specimen voided after operation should be saved and inspected for macroscopic and microscopic blood. This will often suggest whether or not there has been any undue traumatism to the bladder wall, or if there has been any bleeding from a suture line in the bladder itself. After that the urine should be examined twice weekly for mucus, pus, and microorganisms, so that cystitis can be detected early. There is usually some vesical irritability during

the first three postoperative days which is often due to the diminished urinary output and consequent concentration of urine. This should not always be construed as denoting a beginning cystitis.

Aseptic technic of catheterization should be faultless. I do not use a glass catheter and prefer a Furniss metallic catheter. When it is necessary to keep the bladder at rest or maintain drainage, because of bladder trauma or plastic operations involving the bladder, I have followed the practice of Dr. Dannreuther and used the self-retaining right-angled Pezzer catheter. This is allowed to remain in situ as long as necessary. To make sure that the free drainage of the bladder continues, and that the lumen of the catheter is open, it is wise to inject an ounce of boric acid solution twice daily through the catheter.

Catheterization should be performed by a competent nurse, and should be gentle and free from trauma. If the patient struggles because of nervousness, pain or hysteria, or if she is delirious, a member of the house staff should supervise and direct the catheterization. If a cystitis follows catheterization in postoperative gynecologic cases it is really not due to the catheterization. I agree with Curtis and others, that it is due to contamination of residual urine. Of the 66 per cent of patients in whom Curtis found catheterization unnecessary, less than 1 per cent had residual urine. But of the 17 per cent that required instrumental emptying of the bladder three or more times, residual urine was found in about 66 per cent of the cases. The amount of residual urine decreases as the bladder regains its power of complete evacuation. My plan of procedure in postoperative cases in which no plastic operation involving the bladder has been done is to allow the patient to go twelve to fourteen hours before catheterizing. Thereafter the measures previously mentioned to stimulate voluntary urination are employed every eight hours, and if they prove of no avail the patient is again catheterized. After plastic operations on the bladder such as for cystocele, prolapse or repair of vesicovaginal fistula, my plan is to resort to the Pezzer catheter for seven or nine days in the latter and interrupted catheterization in the former as follows: For the first forty-eight hours the patient is catheterized every six hours, for the next six days every eight hours, and then every ten hours up to the tenth day, and then allowed to void. She is usually allowed out of bed on the twelfth day. Following all catheterizations, it is a routine procedure to instil one ounce of 2½ per cent neosilvol solution. Patients also receive a urinary antiseptic. I have preference for formohydrion tablets (Upjohn), which is an acidified urotropin, given every four hours by mouth, in five grain doses. This medication does away with the giving of sodium phosphate or benzoate to acidulate the urine.

## CONCLUSIONS

1. Many operations on the female pelvic organs are followed by urinary disturbances of various degrees of intensity.

2. These disturbances are often the result of trauma to the bladder and its fascial attachments; to traumatism of the bladder by sutures or instruments or to failure to identify the ureter during operation.

3. Faulty technique or errors of omission in postoperative catheterization are probably responsible for some postoperative cases of cystitis.

801 WEST END AVENUE.

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## A STUDY OF THREE HUNDRED PREGNANT NEGRO WOMEN HAVING A FOUR-PLUS WASSERMANN

A SUMMARY OF SIX HUNDRED CASES

BY J. R. McCORD, M.D., ATLANTA, GEORGIA

*(From the Department of Obstetrics, Emory University School of Medicine)*

PART of the data obtained in this study will be summarized with the results obtained in a similar study and published in this Journal, June, 1925. We then have the results of a study of 600 consecutive cases of pregnancy, all having a four-plus Wassermann reaction.

### RESULTS OF PREGNANCY OBSERVED IN THREE HUNDRED WOMEN

Fifty-seven, 19 per cent, of the babies were born dead. Seventeen babies died in the hospital. Twenty-nine, or 10 per cent were aborted. If we add the stillbirths, the babies who died in the hospital, and the cases that aborted, we learn that pregnancy ended disastrously 103 times, or in 34 per cent of the cases. In our prior series there was a similar result in 32 per cent of the cases.

Of the 57 women who had stillbirths, 46 had had no antisyphilitic treatment. Of the 29 women who aborted, 27 had received no treatment. Seventeen babies died in the hospital and the mothers of 13 of these had received no prenatal treatment.

*Prenatal visits and treatments.*—In this series 160 women attended the prenatal clinic one or more times. Of these 160 women only 99 took antisyphilitic treatment. The treatment in most cases was insufficient, as Table I shows.

In so far as we know, not one severe reaction occurred; and we again repeat that we have no hesitancy in giving pregnant women with syphilis, antisyphilitic treatment.

TABLE I

NO. WOMEN TAKING TREATMENT	NO. DOSES NEO- SALVARSAN	NO. MERCURIAL INUNCTIONS
12	1	1
17	2	2
14	3	3
7	4	4
10	5	5
8	6	6
7	7	7
6	8	8
6	9	9
5	10	10
4	11	11
2	12	12
1	13	13

*Histologic studies of the placenta.*—Of the 222 placentas examined, 87 (39 per cent) were positive, and 135 were negative. Twelve placentas were doubtful and not listed above. Of the women who had no prenatal treatment, the placenta was negative 80 times, positive 55, and doubtful 4. Those women who had efficient treatment had 21 negative placentas, 6 positive, and 1 doubtful. Of the women having moderate treatment, 19 were negative, 7 positive and 1 doubtful.

*Examination of the babies by Roentgen-rays.*—No live babies were x-rayed in this series. Pictures were made on 66 dead babies and 34 (52 per cent) gave the characteristic lesions of syphilis. This agrees with some autopsy work we are doing, in which we will show that over 51 per cent of stillbirths occurring in our service are due to syphilis.

*Dark-field examination of liver.*—Secretions were obtained from the livers and examined by the dark-field method 58 times. The organism of syphilis was demonstrated in 39, or 67 per cent.

*Maceration.*—Forty-four of the 57 stillborn babies were macerated. In our last series only 42 per cent were macerated. We have no explanation to offer for this divergence.

*Mortality.*—Two mothers died; one of general peritonitis (puerperal sepsis), the other with eclampsia and lobar pneumonia.

*Fetal autopsies.*—Autopsies were done on 67 of the 74 babies. The results of this histologic work will be reported later.

#### A SUMMARY OF SIX HUNDRED CASES

Thirty-five per cent of the births were premature.

Thirty-three per cent of the cases ended in disaster.

Twenty-five per cent of the cases had a hypertension.

The placentas were positive for syphilis in 43.5 per cent of 320 examined.

## SPONTANEOUS RUPTURE OF A CESAREAN SCAR\*

BY HERVEY C. WILLIAMSON, M.D., NEW YORK, N. Y.

(From the service of Dr. J. Clifton Edgar, Manhattan Maternity and Dispensary)

THE healing of the uterine incision after a cesarean section probably takes place, as described by Couvelaire, and Sehwarz and Paddoek, first by a deposition of fibrin and then by fibroblastic proliferation. In the perfect scar there has to be good wound apposition, then the line of the scar is small and as it contracts it assumes the appearance of the normal uterine wall.

Any interference with the healing will cause an abnormal amount of connective tissue which will result in a weak scar that may separate during pregnancy or labor. Infection is the usual cause. Projection of the endometrium outward into the muscle will also weaken the scar.

The incidence of cesarean scar rupture is given by Holland as 4 per cent. In 78 of his 87 cases the rupture occurred within one month of term and in 34 of the 51 cases in which the location of the placenta was stated, the placenta was under the site of the rupture.

### CASE REPORT

The patient under discussion, B. M., age thirty-three years, was admitted to Manhattan Maternity and Dispensary November 3, 1926. On May 10, 1921, the patient had a high classical cesarean in this hospital, following a prolonged labor. The convalescence was febrile for ten days and during this period bronchopneumonia developed. The patient was discharged in good condition on the eighteenth day following the operation.

The last menstrual period was January 30, 1926 and the calculated date November 6, 1926. The antenatal period was normal. On November 3 at one o'clock in the morning she was suddenly seized with abdominal pain of moderate severity, like a "gas pain." This was soon followed by vomiting and marked weakness. She was brought to the hospital in a taxicab.

On admission, one hour later, the patient was in moderate shock, there was pallor, the pulse was 105 and thready, the blood pressure 90/60. There was a generalized tenderness of the abdomen and both flanks were dull on percussion. It was noticed that the outline of the uterus protruded irregularly at the site of the abdominal scar. The fetal heart was definitely heard in the lower left quadrant, 60 per minute, but very irregular.

At 3 A.M. the patient was conscious with marked pallor and beads of perspiration on the forehead. The pulse was scarcely perceptible, 130 and the blood pressure 80/56. The entire abdomen was dull on percussion, very tender, and it was impossible to map out the fetus on palpation. By rectal examination the head was found to be in the upper pelvis, the cervix thick, and one finger dilated. The fetal

\*Read at a meeting of the Section on Obstetrics and Gynecology, New York Academy of Medicine, November 23, 1926.



heart was no longer heard. Morphine sulphate, .015 gm. was given, saline, 1000 c.c. by hypodermoclysis and 1000 c.c. of tap water by rectum.

At 5:40 A.M. she was transfused with 950 c.c. of blood and at the same time the operation begun. The anesthetic was gas and oxygen with a little ether. On opening the abdomen in the midline below the umbilicus, many large clots were found over the entire anterior aspect of the uterus. These were removed and an opening in the uterus, at the site of the former scar, was found. This was oval in outline, about 8 by 10 cm. and the placenta was in this opening. The placenta had separated at the right margin causing the hemorrhage and there were about two liters of clotted and free blood in the peritoneal cavity. The hand was passed through the placenta, the membranes ruptured and a dead baby was delivered. It was necessary to enlarge the opening at either end. The baby, curiously, promptly developed rigor mortis. A rapid supravaginal hysterectomy was performed. The abdomen was then closed in the regular manner.

After the operation, the blood pressure was 78/50 and her general condition was no worse than before. The blood pressure gradually rose to 100/70 at 10:30 P.M. and was 120 mm. the following day. During the first three days there was considerable abdominal distension which was relieved by enemas. The urine was voided spontaneously. The temperature range was 98.6° to 101°, becoming normal on the thirteenth day. The sutures were removed on the tenth day when the abdominal wound was found perfectly healed.

Dr. Ewing kindly examined the microscopie slide made from the margins of the scar. His findings were: fibrosis and atrophy of the muscle tissue, chronic inflammation, leucocytic infiltration, dilation of the veins, decidua cell infiltration on the inner surface. The opening was due to gradual mechanical atrophy.

This case shows a spontaneous rupture, three days before term, of a cesarean scar with hemorrhage from placenta separation. There were no premonitory symptoms. The scar was undoubtedly defective from infection after the first operation. In this type of case it seems advisable to operate seven to ten days before the estimated date of labor.

#### REFERENCES

- (1) *Couvellaire*: Quoted by Schwarz and Paddock. (2) *Schwarz and Paddock*: AM. JOUR. OBST. AND GYNEC., Aug. 1925, x, No. 2, p. 153. (3) *Holland, E.*: Jour. of Obst. and Gynec. of Brit. Emp., 1922, xxviii, 488.

34 EAST SEVENTY-FIFTH STREET.

# Society Transactions

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## THE NEW YORK OBSTETRICAL SOCIETY

MEETING OF OCTOBER 12, 1926

THE PRESIDENT, DR. GEORGE H. RYDER, IN THE CHAIR

DR. E. A. BULLARD reported a case of **Psychic Amenorrhea**.

Miss J. T. began to menstruate at eleven years of age. Her epochs were regular every thirty days, quite profuse, painless and of six days' duration. She was robust, of an energetic, nervous type, and had had only minor ailments. Her daily life was easy, happy and free from strain until her thirtieth year. Then suddenly, while traveling with her family in Africa, her mother died. This was a great shock in itself but in addition the entire care of her invalid psychopathic father fell to her. The strain was enormous, he was violent, unreasonable, and exacting, and would have no nurse but his daughter.

She never menstruated after the death of her mother, in 1913, and had none of the menses. During the following eleven years she had two nervous breakdowns and was treated in sanatoria by rest cures. On these occasions her weight went up twenty pounds or more, and great improvement occurred in her general health, but menstruation never appeared. No medication was taken at any time directly for the amenorrhea.

In September, 1924, a perfect attendant was at last secured for the invalid father and all responsibility was lifted from the daughter. Then began a period of great happiness; she attended many theatres, concerts and dinners and also secured plenty of rest and sleep. From Jan. 30 to Feb. 1, 1925, a scanty menstrual epoch occurred after eleven years amenorrhea. February, March and April epochs followed at twenty-eight day intervals, painless, of five-day duration and of normal amount. May and June periods were five weeks apart, July and September were skipped entirely, but since then every epoch to the present writing has been normal.

Dr. Bullard first examined this patient in February, 1925. The uterus was forward and of normal size, shape and consistency; the cervix was of normal nulliparous appearance; the ovaries felt to be of average size and not tender; in fact, there was not an abnormal feature to be found anywhere about the internal or external genitalia. As he had doubts about the alleged menstruation, the patient returned for observation during her March and April periods and a bloody flow from the cervix was quite characteristic of menstruation.

In the absence of any demonstrable pathology and in consideration of this striking history it seems highly probable that this is a case of amenorrhea of psychic or nervous etiology.

DR. HOWARD C. TAYLOR said he had a similar case two years ago, a girl, in the early twenties, who had had a sudden mental shock when she saw her mother killed suddenly. She stopped menstruating at once with no return of the menstruation after a number of months. Examination of this girl showed that the uterus was the size of the senile organ, and Dr. Taylor asked whether the uterus in his case was reduced in size or whether it remained normal.

DR. H. C. COE said he recalled the case of a neurotic patient who had had an operation for gall bladder disease and following that menstruation stopped. She was then admitted to the Woman's Hospital for persistent pain over the cicatrix. She had not menstruated since the operation which had been done over a year before. He separated the adhesions along the cicatrix and removed the appendix, which was adherent, and about two months afterwards she began to menstruate regularly. The pelvic organs at the time of the operation were found to be normal. She subsequently bore two children. In these cases we must take into consideration the older accepted forms of amenorrhea. One common class was in strong, healthy, young servant girls, particularly the Irish, who came to this country. Sometimes they had amenorrhea for a year or two. Another class were the young girls who became unusually stout as the result of defective metabolism, though the word "psychic" could not be applied to these.

DR. BULLARD (closing) said in reply to Dr. Taylor that unfortunately this patient was not examined vaginally during those years of amenorrhea. However, he noted no atrophy at the first examination made immediately after the resumption of menstruation.

Dr. Arnold Sturmdorf had told of two cases of prolonged amenorrhea, both due to terrific mental shock, one of six years' duration and the other lasting ten years. The latter resumed menstruation a few months after marrying, became pregnant the next year, and after the birth of her child continued to menstruate normally.

DR. G. L. MOENCH (by invitation) read a paper entitled **A Consideration of Some of the Aspects of Sterility**. (See page 334.)

#### DISCUSSION

DR. W. H. CARY said that it was very difficult to discuss a paper covering all the factors involved, although he had been particularly interested in the study of the semen for some fourteen years. He did not believe that any one now failed to understand the responsibility of the male in a childless marriage. Dr. Cary brought the subject before this Society in 1915, at which time he stated the male responsibility to be 35 per cent. He then classified and gave a nomenclature for the deformities of the sperm heads, and also discussed the minor degrees of semen deficiency. For several years now he had been classifying semen as follows: azoospermia, very poor, poor, fair, good, and excellent. If Dr. Moench has given us any method to more accurately measure the vigor of those specimens that lie in the three middle classifications, the very poor, the poor, and the fair, it is a very valuable contribution. Dr. Cary found it very difficult to determine from microscopic examination of the semen alone, the fertilizing vigor of the various types except the very poor and the excellent. Those motile specimens that are only fair, or poor, offer a very difficult problem to the consultant who is asked to condemn or confirm the male.

Dr. Cary said he must disagree with Dr. Moench as to the Hühner test. His modification of this test, which includes a systematic preparation of the patient and a standardized technique of procedure approximately one hour after coitus, has proved a most valuable step in the study of sterility, especially in these borderline cases. In these tests the patient is instructed to continue reclining one-half hour after intercourse and is also cautioned not to visit the toilet before arrival at the office. Accurate conclusions of the findings require much experience and patient study and must be interpreted in relation to the gynecologic conditions.

He also disagreed with the statement that you can tell by the appearance of the cervix the condition of the cervical mucus as a medium of sperm cell trans-

mission. He satisfied himself to the contrary on that point from a careful analysis of the data of one hundred insemination observations. One conclusion from that study was that from vision alone the density of the cervical mucus in its relation to insemination cannot be accurately ascertained. One can tell the bad endocervicitis cases with thick, purulent mucus, but there is a mucus in the canal that looks glistening and normal and when you attempt to pick it up with the pipet you cannot get sufficient suction to obtain it. A mucus of that density will not allow migration of any but the rare supervigorous semen. Dr. Cary claimed there was no more valuable test in the whole realm of sterility study than the insemination test done on a standard, systematic basis, to determine the relation of cervical secretion to sperm migration.

The doctor then discussed from his standpoint the significance of the various types of semen which were illustrated by the first slide shown by Dr. Moench. He had long emphasized that the motility of the sperm cell is not necessarily an indication of its fertility. The percentage of active cells, the rapidity of the movement and the length of time the activity of the cell continues are three practical points that any one can determine. The reason for error in determining the fertility of the semen is the lack of knowledge of what constitutes a normal semen. If you want to determine the ability of the semen you have to study it in relation to the individual case, and take the specimens both vaginally and cervically, up the cervical canal as far as the internal os. If the reader of the paper were to do his postcoital study in the manner described he would find it most valuable. The semen does not enter the cervix in the pin-hole type of cervix and Dr. Cary was inclined to think it does not travel above the point of flexion in certain types of ante flexion. The fact that the menstrual blood comes through has nothing to do with it at all. The fact is there is deficient drainage with catarrhal accumulation which acts as a block to the sperm cells.

DR. I. C. RUBIN agreed with Dr. Cary in practically all he had said in his discussion. However, there are many things that bear a different interpretation from that which was presented tonight by the reader of the paper, some because they are a little incomplete, others because the observations do not quite tally with those who have really intensively studied this particular phase of sterility, namely, the ejaculated secretion of the male. He felt quite in accord with Dr. Moench that we must now focus our attention more than ever upon the male factor as a cause of sterility; that the figures given in the literature are by no means final; that percentage of incidence is perhaps more guesswork on the part of different authors in their own limited experience. All are agreed that the male is responsible for sterility in his wife in some 30 per cent of cases; that he is also defective per se at the time of marriage in a certain additional percentage of cases; and furthermore, that those morphologic features of the spermatozoa which Dr. Moench has described tonight may be responsible for the relative infertility of the male in a particular mating, and those are things not yet settled.

Dr. Rubin agreed that we must not minimize Hühner's work, as it was the first important biologic step to give us some definite notion as to what takes place during insemination in the vagina and the cervix. He did not agree with Hühner that it is the final thing. Hühner is quite satisfied to exonerate the male from the causation of sterility when he finds living spermatozoa in the vaginal vault and especially in the cervix. That does not, however, show by any means that the matter ends there. We do not know, for example, what is a fertile semen. Motility is not the whole thing. Abundance of motile spermatozoa is only a rough indication perhaps of, let us say, the fitness of that semen, but it does not

mean that any ejaculate of the same male at different times is just as fertile at one time as at another.

As to the abnormal forms of spermatozoa, Dr. Rubin said that for practical purposes, we may consider two or three types, seen either in different planes or at different stages of their life in the ejaculated semen. Two types are most common, the one that Dr. Moench calls megalosperm, with the large round head, and the other, the smaller type designated by Dr. Cary as the microcephalic sperm, which is by far the most abundant in the condom specimen. It is also in the greatest preponderance in the vaginal secretion, and, although the large-headed spermatozoa are in the minority, these are the spermatozoa that reach the cervix. The small microcephalic spermatozoa remain in the vagina where they may be active for a while, but perish there, never reaching the cervix. It is these larger spermatozoa, with the long tails and the whip-like motion, which Dr. Rubin designated for his purposes as the "searching type," that reach the cervix.

After the semen is frozen the motility stops. The deformed types that Hühner described, with the frozen neck or disjointed neck, are very common. Dr. Rubin said he had never seen in the many hundreds of specimens of semen that he examined, any with double heads and double tails, and considered them artefacts or optical illusions. It is possible that the cytoplasm protrusions referred to by Dr. Moench and which he designated as "collarettes," give this double headed picture.

If any further work is to be done along this line, it should be done by supravital staining. He hoped Dr. Moench would take that up. Before he would speak of any particular husband as doing his share Dr. Rubin wanted to see a goodly number of those larger or maturer type of sperm in his semen present in the cervix and exhibiting good motility. Even this does not yet tell us which are the spermatozoa that are really fertile. We have no way of getting at that. Dr. Rubin did not believe that we can exonerate the male partner simply because he is able to deposit motile spermatozoa in the genital tract of his wife.

As regards what Dr. Moench said about the abnormal type of sperm cells being responsible for the relative infertility of a mating and resulting in habitual abortions we know that, as Reynolds has shown, if you increase the vitality of a given male who is relatively infertile, by whatever you prescribe, his fertility becomes heightened. Dr. Rubin saw several definite cases, where the wife aborted several times, and it was only by focusing attention upon the male and improving his health that the next pregnancy was successful and carried to term.

In regard to the female ovum, we are getting some gleam of hope in determining fertility in the woman. What with the sex hormones that are beginning to be developed and standardized on the one hand, and the physiologic researches, particularly of the Carnegie Institute of Embryology, on the effect of ovarian activity upon uterine and tubal physiology on the other hand, it is hoped perhaps the time is not too far distant when we shall be able to test the presence of and the degree of ovarian activity. In determining tubal peristalsis with carbon dioxide insufflation of the uterus at the same time that we test for patency we may be able to find out how the ovaries are functioning. Dr. Rubin believed that within a short time we shall be able to say something about ovarian activity and, perhaps, the ovum itself without depending alone upon the menstrual history, etc., as we were formerly compelled to do. Also in addition to the study of the vaginal flora and the vaginal secretions as found during all phases of the menstrual cycle, the glycogen content and so on, we shall really have an index of ovarian activity even as far down as the ovum itself.

DR. R. L. DICKINSON claimed that if we obtain a mathematical measure of the efficacy of semen we will have stepped far forward in the most neglected section-

of our work, and he urged thorough investigation of a large number of males by this counting and measurement.

Dr. Rubin made a valuable suggestion, namely, that of "behaviorism" of the cell as a test. What type of cell is it that goes into the cervix, he asks. And if he says it is the busiest and most inquisitive, then we have all noted this type which Dr. Dickinson dubbed the "hunting dog" cell, the one that keeps relentlessly searching out its prey on the microscopic field. If that is the type that gets into the cervix, we can then have another test for good semen.

Dr. Dickinson referred to the fact that the genitourinary men had failed to carry on an intensive study of the semen, with the exception of one or two, and that consequently, the gynecologist was the man to continue the work. He said, further, that Frank R. Lillie of Chicago, who has written a book on this subject, "Problems of Fertilization," had stated that it is necessary to know more about the age of the cell, and that some of the active spermatid cells may be relatively old.

The doctor then discussed the possibility of sterility being caused by absorption into the blood in the case of prostitutes and in the case of married women who have intercourse daily or oftener. He had recently asked Dr. Katharine B. Davis to look over the 10 per cent of her schedule of 1000 married women who cohabited daily or oftener, to see whether they showed relative sterility, and that she had reported there was no evidence in her lists that frequent intercourse made women sterile. There were ten patients who have been married ten to thirty years, with daily or nearly daily intercourse who have had from two to eight children; so here are some examples of semen that have not been thinned out and rendered imperfect by frequent intercourse and women with whom no absorption inhibition occurs.

DR. HAROLD BAILEY said that two related subjects are brought immediately before us. First, in regard to antenatal pathology, efforts might be made to determine the proportionate number of abnormal forms in syphilitic and in alcoholic men as compared with the normal, and along these lines we might find something of great interest. Secondly here is the first intimation that abortions may be a conservative act on the part of Nature. We know that 250 or thereabouts of every 1,000 conceptions end in abortion. At one hospital seven abnormal infants were born in 1100 cases. If this is so, it is questionable whether we ought to be so determined to save the ovum in threatened abortions until we know something more about the pathology of the semen.

DR. MOENCH, in closing, said that he wanted to assure Drs. Cary and Rubin that he examined these specimens in the fresh state as well as stained. If, however, one examines the semen only in the fresh state it is impossible to get sufficient magnification to see the finer details of the spermatozoa. In fresh specimens one may recognize arrested development, microsperms and megalosperms, even cytoplasmic extrusions, but the finer nuclear and body changes escape detection. They can only be made apparent with a good stain.

The abnormal forms shown in Fig. 1 are positively not imaginary, nor are they artefacts. In one particular case Dr. Williams counted 213 abnormal spermia among 1,000 where Dr. Moench had counted 231. At the same time he did not claim to be sufficiently well versed in the minor abnormalities of the sperm cells to be able really to recognize and classify all of them and frequently found difficulty in fixing the picture of the normal sperm cell firmly enough in his mind's eye to distinguish minor changes in a particular cell.

Dr. Moench did not agree with Dr. Rubin that most of the cells of an ejaculate are microsperms and that the large spermatozoon achieves impregnation. He felt confident that normally fertile men will show little variation in the size of the sperm heads.

Dr. Moench said he was well aware of the fact that a sperm cell seen from the side is narrower than when seen on the flat. There is no perforatorium in the human sperm but there is a definitely concave point to the cell. All the cells shown were seen on the flat. The double forms were focused on very carefully. One specimen had about 2 per cent double forms and certainly one would not count as many as 20 in 1,000 in one specimen whereas in other specimens one only very rarely saw a double form or perhaps even none at all. The tailless forms, or the tailless heads, do not mean anything unless the head itself is abnormal and we find these tailless forms in cases where there is a lack of division of the anterior end knob in contradistinction to the normal cell in which they are more developed and give a more or less square or rounded base to the cell.

The whole paper as stated is only a preliminary report. It will need hundreds of cases to establish the limits of normal variation. Dr. Moench felt that he did not bring out sufficiently the fact that all the semen specimens reported on showed numerous actively motile spermia and seemed all right on routine examination. It was only when one studied the finer details that the marked difference between good and bad semen examples was evident. It is undoubtedly true, as Drs. Cary and Rubin said, that the sperm depicted belonged in some instances to different stages of development but this in itself is important. Williams and Savage have shown that a bull emitting even as low as 1 per cent immature spermia is inferior as a breeding animal. These investigators have got so far in their investigations that they are definitely able to determine a bull's fertility from the character of the sperm cells, and in a number of instances, where a herd owner refused at first to accept their diagnosis based on measurements and graphs of the sperm heads, a few months were enough to show that they were right. Dr. Moench believes therefore, that if we work up this subject in the human male we are going to arrive not simply at a stage where we can say of the semen specimen "this is good" or "this is bad," but at a point where we will be able to state mathematically "this semen is normal," "this is so far from normal," "this is rather questionable," or "this is absolutely poor."

Dr. Moench said he had not had sufficient experience as yet to be able to even guess what the coefficient of variation or the standard deviation or average mean is going to be, nor could he say what the optimum semen or the optimum graph in man is going to look like, but claimed that the variations in the cases of the human male are high as compared to the bull. But it requires hundreds, probably thousands, of cases to establish anything definite.

Dr. Moench agreed with Dr. Aldridge that the so-called biologic incompatibility will, as we gain further knowledge, be shown not to be an incompatibility at all. At present we simply do not know enough about the problem to tell what is the basis of the sterility in these cases.

As to the Hühner test, Dr. Moench persisted in disagreeing with Dr. Cary. He did not say the test was valueless but that it was misleading. After all, however, this is simply a matter of a difference of opinion and it seems that the only thing to do is to find out why such a difference of opinion should exist. He could only say that he had found nonmotile spermia in compatibility tests done on fertile women and motile spermia in the cervix of women who had no pathologic findings but had never conceived. Sometimes nonmotile spermia, when placed on the slide in warm normal saline solution, would become active. Dr. Moench was unable to offer definite reasons for this phenomenon. In the case D (which had the very poor sperm head graph) the spermatozoa were actively motile and the compatibility test normal but stained smears showed up the inferior quality of the semen, that is, the variations in the size of the sperm heads and the percentage of abnormal forms were far too large.

## BROOKLYN GYNECOLOGICAL SOCIETY

MEETING OF MAY 7, 1926

DR. C. G. NORRIS of Philadelphia read by invitation a paper entitled **Factors Influencing End-Results in Carcinoma of the Cervix After Irradiation.** (For original article see page 279.)

### DISCUSSION

DR. C. A. GORDON said he was of the impression that as people grew older, the virulence of the cancer grew less, and he wondered whether possibly some of the patients in the older age groups died from some other condition, thus making the statistics even a little better than shown in the table.

Dr. Gordon believed that surgery for cancer of the cervix is a thing of the past, but that we should not use radium, or x-ray either, for any localized cancerous growth unless we know something of the histologic character of the cancer in question.

DR. S. A. WOLFE said that in the present stage of treatment of carcinoma of the cervix, the pathologist has only a limited idea of the disease because only biopsy material is offered for examination. In reviewing a number of uteri that had been removed by radical hysterectomy some years ago, however, carcinoma of cervix was seen to present three different gross types which influence the time of onset of symptoms and the rapidity of extension into the broad ligaments in the course of the disease.

In the first group are the familiar cauliflower types of carcinoma, or the everting form. These grow on the surface of the cervix and extend directly into the vaginal tube. Growth into the cervix, or into the broad ligament, occurs late. Implantation into the vagina, however, is of frequent occurrence. Dr. Wolfe believed that the onset of symptoms in this particular group will be relatively early, because this carcinoma is in the vagina and subject to infection. Secondary ulceration follows with the appearance of "dish-water" discharge, indicating necrosis of the tumor. This occurs before broad ligament extension or lymphatic involvement is marked.

The second type of carcinoma is the so-called endocervical or infiltrating carcinoma. The portio is relatively uninvolved, as the bulk of the carcinoma is higher in the cervix. Symptoms do not appear in this group until necrosis and ulceration have taken place. Long before, however, extension into the broad ligament and lymphatic metastases have occurred. Yet the duration of the symptoms in this gross form of the disease is relatively short.

The third form of carcinoma of the cervix, which he arbitrarily called the infiltrating type (of course, pathologically, all these forms are infiltrating), is one which begins in the portio or near the external os and grows inwardly, destroying the cervix in its course of development. This group, occupies an intermediate position from the standpoint of the rapidity, onset of symptoms and extension into the broad ligament.

Histologically we have classified cervical carcinoma for the past two years. Four types are recognized.

The first type, which is least malignant, is the old-fashioned squamous carcinoma, which produces prickle cells and keratin pearls.



The next most mature is the adenocarcinoma. Embryologically, of course, adenocarcinoma and squamous cell carcinoma come from the same müllerian tissue.

In Group 3 the transitional epidermoid cell is prominent. The prickle cell is replaced by a round or polyhedral cell with reduced cytoplasm and a more prominent nucleus.

In the fourth group the predominant cell is the fat spindle or basal cell first so designated by Martzloff. The cell has scant cytoplasm and is almost wholly filled with a large prominent oval nucleus, rich in chromatin.

Pure forms are seldom seen. Even the adenocarcinoma show solid alveoli simulating epidermoid epithelium where growth has been extensive. Group 3 not infrequently shows a wide zone of Group 4 carcinoma.

With the prognosis based on the histologic pictures presented by a small section of the tumor obtained by biopsy, only a relative idea is obtained of the predominant cell type in many of the carcinoma.

The gross form of the disease should, therefore, be correlated with the microscopic picture and comparison of histologic malignancy should be made only in tumors of the same gross type. A Group 3 carcinoma of the cauliflower type very likely offers a better prognosis than a Group 1 cancer of the infiltrating or ulcerating type where the tumor has run its natural course before the onset of clinical symptoms.

In conclusion, the following factors must be correlated in prognosticating cervical cancer: the gross form, the histologic character, the local extension and the duration of the clinical symptoms.

DR. W. S. SMITH commented upon the amount of radium placed in the uterus, as shown in the slide where the radium was in one position, whereas the rest of the uterus showed no evidence of radiation whatsoever. He believed it better to use at least two tubes in order to spread it out over a greater area of the uterus, and possibly it would be wiser to even use three tubes so as to cover the entire length of the uterus, because the radium is apt to slide down.

Dr. Smith also emphasized the use of the cautery plus radium. In a small number of cases, the women who have been subjected to cautery and high amputation of the cervix plus radiation at the same time have done very much better than those in whom the radium was used alone.

DR. W. A. JEWETT said that those who look at this question from a clinical standpoint have in years past felt that the statistics were rather unsatisfactory because of the different starting point of the reporters. The work that has been done in Philadelphia demonstrates the newer method of handling the situation in typing the cases clinically so that the pathologist in his report and the clinician in his work can have a proper clinical picture of the exact type of disease with which he is dealing.

DR. NORRIS (closing) said this work was only in the nature of a preliminary report.

Dr. Wolfe brought out a very definite point. In the first place, if you are going to try to make any classification from groups, you have to be able to group them. In other words, is it possible with a primary factor to group cervical carcinoma in any more definite groups than adenocarcinoma and epidermal? Dr. Norris did not altogether agree with Dr. Wolfe. It seemed to him this was possible, but that is an individual opinion which time may alter.

It also seemed to him in contradistinction to what Dr. Wolfe said, that these tumors do not alter their condition other than as the result of local changes. In other words, where you see a transitional cell type in one part you see a transitional cell type in other parts. If you cannot classify them, you may just

as well say: "They are all malignant, treat them all the same; there is no prognostic value about it," and we know clinically there is a difference; there is a difference in response, but whether that is a chemical proposition in the blood or something foreign to us is a question. Dr. Norris does not believe we can answer that until the cause of cancer is known.

In regard to the question of age: Dr. Norris believed that the younger the tumor the more malignant it is prone to be. Cervical cancers occurring in young individuals generally seem to be more rapid in their growth and cause earlier metastases than in older individuals.

The important thing about the study of cancer is the question of classification, including the extent of the disease and the method of reporting statistics. The vital point in any series of cancer statistics is—how many total five-year cases have you seen? How many of those cases are alive?

Then there should be a uniform method of dealing with lost or untraced cases, and there should be some uniform method of grouping cases, because when a patient first comes and asks "What are my chances?" it is only a plain business proposition that one should be able to say to her or to her family (of course, they are the ones you ought to tell, and not the patient), "You have a one to three chance, you have a three to one chance, or you have a 20 per cent chance," or whatever the figure may be. In fact, the American College of Surgeons has a classification, which is practically identical with that used by Dr. Norris.

In the cases reported he did not take up treatment in detail because the paper was not on treatment. They were all treated practically with a uniform dosage of the element, 2400 milligram hours, 100 milligrams for twenty-four hours. That has been the standard dosage, beginning with three of the doses about three weeks apart. Too many vesicovaginal fistulas occurred and they got the idea that they were getting most of the results from the first treatment, so for a time they gave only one treatment, and these statistics are based almost entirely on one treatment. Only the advanced cases were treated by radium. The earlier ones were treated by operation.

Dr. Norris is now treating with 2400 milligrams of radium and keeping the cases under careful observation, noting the response, and in many cases are giving a second treatment, and sometimes a third treatment, according to the response to irradiation.

As to the method of applying the radium, it must be in the canal. Second treatments are given by needles, sometimes raying in the broad ligaments, or whatever the case may require.

# Department of Reviews and Abstracts

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CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

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## Collective Review

### New Books

BY ROBERT T. FRANK, A.M., M.D., F.A.C.S., NEW YORK CITY

#### THE PHYSICIAN AS AN INDIVIDUAL

I shall start my review with four books dealing not only with the work of physicians but with the physician as a human being. Some of this material is biographical, some imaginary, and in one of the volumes, biography and imagination have been freely mingled. What is most apparent after having read these four books, is the clear-cut record of his own personality which the biographer reflects in his writings. This would signify that it is almost impossible to focus a true light on an individual unless the author is unusually objective, this resulting, as a rule, in a dry colorless biography, or that the person write his own autobiography in which case the reflection of his personality in his writings will only add to the truth of the concept that we can form.

The first book deals with Sir James Mackenzie whom his Lancashire patients called "the beloved physician" on account of his kindness and sympathy. Born of humble parents in Scotland, brought up under mediocre conditions, considering himself a dunce, and revolting against the huge prestige which memory enjoyed in contradistinction to reason, in the schools of those days, Mackenzie grew up to hate the academic system which did not teach the student how to study. Athletic and good at games, shy and overdiffident, his engaging personality nevertheless singled him out for residency at the Edinburgh Royal Infirmary, and early in his career he was invited to join a flourishing firm of practitioners at Burnley. Thus everything pointed to Mackenzie's remaining a humdrum general practitioner. The tragic death of a young woman at childbirth, from heart failure, the fact that he was unable to make a diagnosis or give a verdict to patients who complained of cardiac pain, first directed Mackenzie's investigations to the study of heart disease. The first important observation was that the arrhythmia due to missed beats or as he called it, the "irregularity of the youthful type," involved no danger. From then on came discovery after discovery which finally placed Mackenzie in the forefront of cardiac investigators. The entire book is written in a most sympathetic and charming way; if anything, it is a little more saccharin than the robust and manful personality of Mackenzie warrants.

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<sup>1</sup>The Beloved Physician. Sir James Mackenzie. By R. Macnair Wilson. The Macmillan Co., New York. 1926.

No such accusation can be made against the author of the second volume to be discussed in which De Kruif<sup>2</sup> has taken keen pleasure in over-emphasizing the foibles of men whose names are indelibly connected with real and often wonderful achievements, in a fashion which resembles the "smart Alec" attitude of the school boy who tries to magnify himself by pointing with the finger of derision to the feebleness of his teachers.

Paul de Kruif has presented the high lights of bacteriology in fascinating, popular, newspaper language, emphasizing two points, one, the romance of the quest, and two, the fact that "The gods are frankly human, sharing in the weaknesses of mankind, yet not untouched with a halo of divine Romance" (E. H. Blakeney). Although I confess that I was fascinated by the book, many of its passages aroused keen indignation because the author appears to distort facts to suit his purposes and, to my mind, totally misinterprets the character of his dramatic personae. Recently Bruce and other members of the Sleeping Sickness Commission, in a letter addressed to the editor of the *Journal of the American Medical Association*, sharply called the author to task for misstatements in the book. I feel sure that those so inclined could point out a number of other mistakes that have crept in. I would be willing to forgive many inaccuracies were not the second fault of the author, his unkindness toward investigators, his constant emphasis of their being "muddlers," his stressing of their human weaknesses to an unkind degree, his harping upon the fact that practically all of these investigators had to feel their way, made mistakes and errors which in the light of further knowledge, now appear puerile. This warped attitude has spoiled the pleasure with which I would otherwise have perused the book. To a laboratory worker, and De Kruif I understand was such a one, it should be plainly apparent that the only way to pursue the hunt for enlightenment, is by unprejudiced, planned groping. Perhaps De Kruif, and I say this without knowing his work or record, may be of the type of workers who makes a hypothesis, upon it builds a theory, and then tries to find the facts which will prove it, to my mind a method to be distinctly discouraged.

I am particularly sorry that the public at large, because this book has a tremendous sale, should be given such false impression of Pasteur, the founder of modern medicine, bacteriology, surgery, etc., the man who, handicapped by a paralysis in his early manhood days, conducted under most discouraging circumstances and inadequate equipment, his search for truth and enlightenment, and found cures for some of the worst diseases with which mankind is afflicted, persisting until death finally overtook him. I deplore that the public should see emphasized the human weakness of men like Metchnikof and Ehrlich, one-sided individuals, but tireless workers and discoverers.

I hope that the good contained in this book will overshadow the bad, and that the lay public will be lured by the author's striking exposition to pursue their awakened interests in more critical, if less attractive, volumes.

The third volume *The Practical Surgery of the Joseph Price Hospital* written by Kennedy<sup>3</sup> is to all intents and purposes a memorial to Joseph

<sup>2</sup>*Microbe Hunters*. By Paul de Kruif. Harcourt Brace & Co., New York, 1926.

<sup>3</sup>*Practical Surgery of the Joseph Price Hospital*. By James Wm. Kennedy, M.D., F. A. Davis Co., Philadelphia, 1926.

Priece himself. With laudable loyalty Kennedy records the dexterity, simplicity, and thoroughness with which he says the surgery of Joseph Priece was associated in the minds of those who knew him. He disclaims having looked up the literature before starting on his book and any one reading through this volume will agree with him. Kennedy says that Priece was often spoken of "as the American Tait" and that he always made a plea for early work followed by radical toilets and removal of the distal infecting source. The subjects of most interest, from our point of view, that are covered, are vaginal hysterectomy, ectopic gestation, repair of the cervix, perineum, and cystocele, tubal and ovarian infection, puerperal infection, tuberculous peritonitis, and drainage in abdominal surgery. Many other lesions and techniques are discussed.

According to the recorder, in 85 per cent of those cases in which it is indicated, vaginal hysterectomy can be done in from two to three minutes by means of the clamp technique. In 98 per cent of operable malignancy of the uterus, this operation has been performed. This includes malignancy of the cervix. The same operation is recommended for prolapse of the uterus, hyperplastic uterus, and with "abused cervix." No attempt to lay down indications for the operation, no mention of the change in indications since the introduction of the x-ray and radium in gynecology, no statistics of any kind are forthcoming.

The pigeon-holing of one operator as a "toilet operator" and the other as a "physiological surgeon" while descriptive and perhaps original, strikes me as neither scientific nor elegant.

That Dr. Price "in many cases," said that "one should make the diagnosis of ectopic from the peculiar mental attitude of the patient which was often indicated by her facial expression," bespeaks an acumen and flair as well as imaginativeness which, I confess, the fewest of us have been endowed with, nor do I think that any serious student of sex physiology will accord serious consideration to Dr. Price's opinion that there is greater likelihood of ectopic gestation following rape or illicit intercourse. Presumably Dr. Kennedy means "Hegar" when he regularly speaks of the "Hager" operation. I cannot see that anything new has been contributed to the technique of cystocele or repair of the perineum or anything which makes it worth while recording.

What Kennedy says about the danger of curettage is to be endorsed in every way, and is being endorsed by every modern teacher who tries. I will confess, as a rule in vain, to teach his students not to tamper with the interior of the uterus, especially if infection is suspected and to impress them with the fact that the curette was reinvented by Ruge as a diagnostic instrument solely. Apparently early and radical intervention in tubal infections was the practice of Priece, as soon as pus was suspected, which included, according to his biographer, close to 95 per cent of all the patients who had tubal and ovarian infection. While some *surgeons* who practice gynecology will agree with this viewpoint, a majority of *gynecologists* who have tided patient after patient to the asymptomatic stage will not believe such radicalism justified. This applies especially to those of us who twice within the last thirty years, have been almost swamped by waves of radicalism in treating pelvic infections, only again to see common sense and conservatism gain the upper hand. Priece and his pupil are correct in saying that after entering the abdomen for inflammatory disease, radical removal of "a mountain of pathology," if such journalistic jargon is to be used in serious writing,

is preferable to what he probably would call "tinkering technic" but such intervention may be indicated in 25 per cent, not 95 per cent. The discussion of puerperal infection is so involved that I am unable to form any idea of the method of diagnosis or the form of treatment recommended.

The space for review prevents my giving this book as full a discussion as I should like to. From it I gather that Joseph Price was a forceful, original man, a tremendous driving force who inspired either friendship or enmity. This very personal book may keep his memory green in the hearts of his friends. It is unfortunate that the one-sided, unscientific, combative method of presentation selected by the biographer can only serve to increase the prejudice against Price's over-radical teachings. The book records many techniques which are simple and direct, and which, doubtless, Price in many instances worked out for himself, but which other operators years ago developed and many of which they have abandoned for better procedures.

The final book to be discussed under the heading of "The Doctor as an Individual" is a French medical novel translated by Joseph Collins.<sup>4</sup> Here the medical profession is held up to the lay public for dissection and largely for contempt. The novel itself is most mediocre, the characters overdrawn both as to their good and bad qualities, and the moral to be drawn is so melodramatic and improbable, as to fail in carrying conviction. The translation is smooth.

#### GYNECOLOGY

The third edition of Veit's *Handbuch der Gynäkologie*<sup>5</sup> is appearing under the direction of Stoeckel. The first to be put into print is the second volume. A great majority of the authors appear to be new, although some of the old guard, such as v. Franqué, Kehrer, Menge, Meyer, Opitz, Pankow, Sellheim, Tandler and Walthard represent the transition from Veit's immediate contemporaries to the younger generation.

The second volume contains a 350 page description of the female hygiene by Hugo Sellheim who has written on similar subjects in a large monograph of his own as well as in the Halban and Seitz *Biology and Pathology of Women*, and in Döderlein's *Handbuch*. Sellheim handles this somewhat large and diffuse subject in a very clear cut and understandable fashion. It is true that the actual instructions to be given to the growing child, the nubile young woman or the bereaved widow are somewhat vague, but those who are interested in finding more detailed discussion of a given topic have the modern German literature pointed out to them by the author. The life of the female child is taken in hand from the time of birth through the ages of prepuberty, puberty, marriage, and gestation. The adaptation of woman to education, society, and occupations is discussed. Much space is devoted to the trends of women's dress, the influence of fashion and fads upon the female form, and similar questions. The illustrations show the careful selection and artistry of the author to a striking degree.

<sup>4</sup>*Our Doctors*. By Maurice Duplay. Translation and preface by Dr. Joseph Collins, New York, Harper & Brothers, 1926.

<sup>5</sup>*Handbuch der Gynäkologie*. By J. Veit, Ed. 3 edited by Prof. Dr. W. Stoeckel. Second Volume. J. F. Bergmann, München, 1926.

Meisenheimer, in a shorter article, discusses the laws of inheritance, first in animals and then the direct application of Mendel's and other theories to the human being. Such subjects as inheritability of normal habitus, of diseases, and malformations are thoroughly illustrated. Determination of sex is fully discussed. I am glad to say that this volume is completed by an author and subject index which is so painfully missed in the Halban and Seitz publication.

It is to be hoped that Stoeckel will be able to produce as useful and authoritative a handbook as his predecessor, Veit, succeeded in editing. Unless he takes great care in obliging his collaborators to study and utilize the world's literature, instead of confining their articles to German sources, the new edition will never attain the worldwide popularity that previous editions enjoyed, particularly among the older generation of gynecologists and obstetricians who still believe that the science of medicine knows no political or racial boundaries.

And still they come.<sup>6</sup> Since my last review in July, five installments of Halban and Seitz's *Biologie und Pathologie des Weibes* have arrived. The mass of material dealt with in this series, as well as the tremendous range of subjects, is amazing. It is really impossible in the form of a review, to give more than a catalog of the subjects.

Installment 25 contains "abnormal length of pregnancy" by L. Nürnberger. He deals with both the too short and too protracted condition. Abortion and premature labor have been divided between Nürnberger who treats of the anatomy, and Heynemann who discusses the clinical aspects.

Installment 26. In this, Krukenberg describes the anatomy and mechanics of the pelvis, while E. Martin discusses the contracted pelvis. Martius has covered both abnormal presentations and the abnormal size of the child, as well as fetal malformations of import to the obstetrician.

Installment 27 contains the relationship between skin and the pelvic organs by J. Novak, illustrated with some excellent colored figures of skin diseases, a most important contribution to the subject. The same author deals with the relation of infectious diseases to normal and diseased conditions of the female genitalia, while Weinberger describes the relationship between the organs of respiration and the female genitalia.

In installment 28 the same author concludes this theme. Schur has the subject of metabolism and gynecology. E. Schwarz describes the important relation of the adrenals to the sex organs as well as that of the spleen and pancreas.

The last installment to be received, 29, contains Seitz's contribution on toxicosis and dyscrasia of pregnancy, while Essen-Möller writes on eclampsia and eclampsism.

The work, as mentioned at the outset, is assuming colossal proportions. I reiterate that its entire success will depend upon a detailed and most minute index of both authors and contents, with careful, cross indexing to make ready reference easy. Without this, the average reader will decline to search for a given subject in the thousands of pages covered.

The sixth edition of the standard textbook by Crossen, on *Diseases of Women*<sup>7</sup> has appeared. As in the previous edition, the chapter on inter-

<sup>6</sup>*Biologie und Pathologie des Weibes*. Edited by Josef Halban and Ludwig Seitz. Urban und Schwarzenberg, Wien, 1926. Installment 29.

<sup>7</sup>*Diseases of Women*. By Harry Sturgeon Crossen, M.D., ed. 6, The C. V. Mosby Co., St. Louis, 1926.

nal secretory glands is written by Hugo Ehrenfest. Not many changes were necessary as the book was fully up to date. This textbook together with Crossen's *Operative Gynecology* has gained an enviable place in American gynecologic literature because of its completeness, clearness, and ease of reference.

The chapters dealing with General Technic, of Bumm's *Operative Gynäkologie*<sup>8</sup> were completed by the author before his death. The second half on Special Operative Gynecology shortly will appear under the direction of Warnekros, completed from the voluminous notes and sketches left by the deceased master. The first portion now at hand corresponds in many ways with the well-known lectures on obstetrics, published years ago by Bumm, which, to me, have always seemed one of the most masterly expositions of midwifery. Bumm apparently tried all the newer methods of intraperitoneal antisepsis and returned to the well-established technic of drainage or extraperitonealization. He devotes considerable space to local conduction as well as to sacral anesthesia. In his opinion both ether and chloroform have their indications, as well as acetylene (naryeelene). All the details of preparation, a description of his simple operating table and source of illumination are entered into. Excellent anatomic pictures of all the methods of vaginal approach are given, with a clearness and simplicity which we have learned to expect from his book on obstetrics. The same applies to the carefully illustrated technic of laparotomy. The method of closing the hernia of the umbilical cord in the newborn is shown, as well as the sacral approach to the pelvic cavity and the transthoracic operation for emboli devised by Trendelenburg.

Segond<sup>9</sup> has given a small anatomic atlas of the gross innervation of the genital organs of the female, based largely upon the dissection made by Hovelaeque. He believes that resection of the nerves, especially of those coming from the superior hypogastric plexus, should cure "ovarian pain" and dysmenorrhea as well as similar functional disturbances. No mention of Harris' ineffective and discarded operation for resection of pelvic nerves is made.

#### OBSTETRICS

With his accustomed diligence and thoroughness, Vignes, together with Dauphin, has started an obstetrical year book called *L'Année Obstétricale*<sup>10</sup> covering the works of 1924. In his introduction, Vignes says one of the greatest annoyances to the true worker is to find out that his scientific achievements are disregarded by the workers of other countries. This disregard is sometimes due to "méfiance," or a false idea of patriotism, with the consequent placing of obstacles to the progress and knowledge of medicine. A tremendous number of subjects are covered, which it would be futile to attempt to give in the form of a review, as the book itself is an epitome. The introductory chapters deal with the burning questions of the day, such as the causes and nature of the toxemia of pregnancy, the effect of the radiation on reproduction, and sim-

<sup>8</sup>*Operative Gynäkologie. I.* By Ernst Bumm. Allgemeiner Teil mit 159 Abbildungen. J. F. Bergmann, München, 1926.

<sup>9</sup>*Innervation des Organes Génitaux de la Femme. Deductions Chirurgicales.* By Dr. Robert Segond. Gaston Doin et Cie, Paris, 1926.

<sup>10</sup>*L'Année Obstétricale (Travaux de 1924).* By H. Vignes and J. Dauphin, Masson et Cie, Paris, 1926.



ilar queries. The book shows very careful editing and compression. It will prove of use to every obstetrician. Let us hope that Vignes and his collaborator will each year continue this most useful and important task.

Comparing the old fourth edition of Edgar's *Practice of Obstetrics* with the new sixth edition<sup>11</sup> revised by Vaux, it becomes apparent that the book has gained instead of lost by being deleted of 300 pages. The new edition is on much better paper, which has brought out the illustrations to a wonderful degree. It contains all the good of the older text, which made Edgar's book such a popular one, and it has been brought well up to date in most respects. We would suggest that in the next revision the number of variations of deciduitis be reduced from seven to one, and that the pathology of chorionepithelioma be rewritten to conform to the modern view, that the division into chorioadenoma and chorioecarcinoma is not warranted, and that furthermore, in describing the treatment of eclampsia, much greater stress should be placed on the Stroganoff method than on the rapid emptying of the uterus, which, in our opinion, is being less and less used by conservative obstetricians who realize the nature of eclamptic toxemia though still ignorant of its cause.

The second edition of de Moraes' book<sup>12</sup> is rather large and complete for a propedeutic. The author has quoted a tremendous amount of literature without giving the actual references. He dilates considerably on associated topics such as the general body form, endocrinology, and biologic tests for pregnancy. He believes that the interstitial cells of the ovary are important, on the other hand entirely neglecting to mention the newer knowledge which the discovery of potency of follicle fluid has thrown upon the ovarian function. He has collected sixteen biologic tests for pregnancy but naturally realizes their shortcomings. The book should appeal rather to the advanced than to the junior student because of its broad generalizations.

Under the title of *Clinica Obstétrica*<sup>13</sup> the fourth edition of Liepmann's well-known *Das Geburtshilfliche Seminar* has appeared in an excellent Spanish translation with all the text and beautiful illustrations of the German original. Montobbio showed good judgment in selecting such an unusually instructive work for translation.

*Aids to Obstetrics*<sup>14</sup> has reached its ninth edition. This pocket-sized manual evidently has some appeal. It has the faults as well as the few virtues which are necessarily inherent in this type of compend.

The dean of German gynecologists, Winter,<sup>15</sup> has written a most useful pamphlet for practicing physicians on the induction of abortion, its indication, methods, and legal standing. The book shows Winter's usual thoroughness. He says the purpose is "not one unnecessary abortion and not the omission of a single necessary one." In the German clinics the demand of patients for the induction of abortion is justified in from 25 to 42 per cent only. The subjects discussed include the toxiosis of pregnancy, diseases of the ovum, diseases of internal organs, of the brain

<sup>11</sup>*Practice of Obstetrics. For Students and Practitioners of Medicine.* By J. Clifton Edgar, Ed. 6, P. Blakiston's Son & Co., Philadelphia.

<sup>12</sup>*Propedeutica Obstétrica.* By Arnaldo de Moraes, Ed. 2, Graphica Sauer, de Fred. H. Sauer, Rio de Janeiro, 1926.

<sup>13</sup>*Clinica Obstétrica.* By Dr. Guillermo Liepmann, Ed. 4, translated by Dr. Victor Conill Y. Montobbio, Barcelona, Salvat Editores, 1926.

<sup>14</sup>*Aids to Obstetrics.* By Samuel Nall, revised by C. J. Nepean Longridge, Ed. 9, William Wood & Co., New York, 1925.

<sup>15</sup>*Der Künstliche Abort. Indikationen, Methoden, Rechtspflege fuer den Geburtshilflichen Praktiker.* By Prof. Dr. G. Winter, Stuttgart, Ferdinand Enke, 1926.

and its appendages, diseases of the special senses, as well as social and eugenic indications. Throughout the author assumes the most conservative but openminded position. His stand on tuberculosis appears to me a trifle too rigid as he regularly declines to induce abortion in all latent forms although he acknowledges that a change for the worse may be expected in up to 20 per cent. He naturally agrees that in the presence of any activity pregnancy should be cut short. Among the eugenic indications, all hereditary diseases may indicate interruption. Among these he includes dementia precox, idioey and severe epilepsy, hereditary ataxias, spastic spinal paralysis and choreic troubles. Retinitis pigmentosa is also included. Pregnancy resulting from rape may not be interrupted. The concluding chapter deals with the German law. The book is most useful and I suggest its translation into the English language.

V. Pehan and Katz have devoted their monograph<sup>16</sup> to the instrumental perforation of the pregnant uterus as well as to the methods of avoiding this unfortunate and serious accident. The material is based largely on the cases seen at the Medico-Legal Institute of Haberdas and perforation was found due, in the greatest number of instances, to the intrauterine treatment of incomplete abortion. A hundred cases have been used for the brochure occurring between 1906 and 1925. Eighty-six cases came to autopsy. By far the greatest number occurred after attempts at criminal abortion. He leaves the question open whether the instruments used or the man behind the gun are the chief cause of fatalities. The concluding one hundred pages of the two hundred page monograph are occupied by detailed histories of the one hundred cases, and fairly complete reference to the German literature.

The short monograph by Benda<sup>17</sup> on the effect of pregnancy upon the reticuloendothelial system should prove of use to those interested in this phase of gestation. He concludes that in the second half of pregnancy the permeability of the capillary walls are much increased and that the maximal permeability is found in the pregnancy toxæmia, especially in eclampsia.

#### KIDNEY; INTESTINE

*Examination of the Urinary Tract* by Carlo Colombino<sup>18</sup> is a practical manual of cystoscopy, profusely illustrated, thirty of the cystoscopic pictures being in colors. This book is limited to the female and is meant especially for gynecologists and obstetricians. The usual methods of examination, including pyelography, are adequately described. The newer chemical methods of investigation are not featured. The book appears to be an excellent practical manual.

Judging by the many books on the lower bowel and proctology that have appeared in quick succession, the subject must have a wide appeal. The second edition of Hill's manual<sup>19</sup> contains a short exposition of the

<sup>16</sup>*Die Instrumentelle Perforation des Graviden Uterus und Ihre Verhütung.* By Prof. H. v. Pehan and Privatdozent H. Katz. Wien, Julius Springer, 1926.

<sup>17</sup>*Das reticulo-endotheliale System in der Schwangerschaft.* By Dr. Robert Benda, Wien, Urban und Schwarzenberg, 1927.

<sup>18</sup>*L'Esplorazione Della Vie Urinarie. Nella Pratica Ostetrico-Ginecologica.* Dott. Carlo Colombino, Milano, L. F. Cogliati, 1926.

<sup>19</sup>*A Manual of Proctology.* By T. Chittenden Hill, M.D., Ed. 2, Lea & Febiger, Philadelphia and New York, 1926.

subject. The concluding chapter is on the radical operation of cancer of the rectum written by Robert C. Coffey, which appeared in *Surgery, Gynecology and Obstetrics* in 1924.

#### EMBRYOLOGY; GENETICS, ETC.

*Evolution and Genetics* by Morgan<sup>20</sup> is almost a second edition of his *A Critique of the Theory of Evolution* published ten years ago, although the last two lectures dealing with the "noninheritance of acquired characters," and "a criticism of evidence of human inheritance" are distinctly new. The clear cut yet simple handling of these vastly interesting problems is a joy to any reader. Of particular interest to the medical reader is the inheritance of malformations, especially the preservation and opportunity to marry of individuals transmitting recessive characters. This is what causes the spread of such abnormalities. The transmission of color blindness, albinism, night blindness, hemophilia, and the transmissibility of blood groups, interests the medical man. Morgan concludes his book by saying that the geneticist finds it impossible to discover, with any reasonable certainty, the genetic basis of behavior, and emphasizes that in contrasting "groups" material advantages and disadvantages resulting from many causes must be taken into consideration. He says, "A little good will might seem more fitting in treating these complicated questions than the attitude adopted by some of the modern race-propagandists."

The *Textbook of Embryology* by Jordan and Kindred<sup>21</sup> is well compiled, clear cut and detailed, bespeaking much familiarity with teaching. The illustrations are culled from many sources to which in every instance due credit is given, and they are selected with good judgment. On the whole, this book is most acceptable. I notice, with some surprise, that Allen's theory of the cyclical formation of the ova in the mouse is accepted without reservation and that Schochet's fanciful hypothesis that follicle rupture occurs from enzymatic action is likewise conceded.

The authors show good judgment in enlivening their somewhat dry subject by incorporating the biological applications of embryology in the text, for instance, the interesting speculation on the continuity of germ plasm, the problems having to do with the determination of sex, sex reversal, bisexual potentiality as the effect of environment, and the recapitulation theory as it affects embryologic research.

The concluding portion of the book contains a short laboratory guide with illustrations of much matter dealt with in the laboratory exercises. Altogether this book is a distinctly acceptable textbook for both student and practitioner.

A small booklet entitled *Birth Control and the State*<sup>22</sup> appeared in part in the *Saturday Review*. Blacker has written both a plea and a forecast. He describes the political, the religious and ethical opposition to birth control propaganda and likewise emphasizes the fear of some who dread the possibility of promiscuity following the general popularization of such teaching. He then draws the conclusion that the late war

<sup>20</sup>*Evolution and Genetics*. By T. H. Morgan, Princeton University Press, Princeton, 1925.

<sup>21</sup>*A Textbook of Embryology*. By H. E. Jordan and J. E. Kindred, New York, D. Appleton & Co., 1926.

<sup>22</sup>*Birth Control and the State*. By C. P. Blacker, M.R.C.S., E. P. Dutton & Co., New York, 1926.

was largely due to the overpopulation of Germany and believes it is the duty of the English medical profession to take steps "in the direction of an international control of population and would thereby lay the basis for a genuine and permanent world peace." The author emphasizes that at present we have no really satisfactory contraceptive applicable for all cases. The tone of this little book is sane and objective. Whether or not the political deductions made are justified, the American profession might at least recognize the fact that this propaganda is gaining ground steadily and is here to stay. How long it will take to overcome the obstacles offered by certain governmental and religious groups remains to be seen, but, particularly in countries where women have the vote, an entire change of policy will unquestionably be forced upon the politicians.

*Problems of Human Reproduction*<sup>23</sup> is a rather small and well-written book meant for the general reader and is supposed to contain whatever is new, not yet widely known, which might prove useful and interesting. The book deals with a very large amount of interesting detail. Unless the reader, however, is unusually well informed, particularly on subjects of biology, I am afraid that some of the contents will be above his head. To the medical man interested in a general survey of this important subject, the book has considerable to offer in spite of numerous inaccuracies.

#### ENDOCRINOLOGY

A new three volume handbook<sup>24</sup> on internal secretions is appearing under the editorship of Dr. Max Hirsch of Berlin. The bulk of the contributors are from Germany, a few from Austria, and four from New York City. Of the latter, only one can be regarded as being representative of American research or opinion. So far only the first installment of volumes one and two have been submitted to us for review. Volume one contains an introduction by Hirsch, and an article dealing with the pancreas (Herxheimer of Wiesbaden), with a very detailed and satisfactory discussion of the anatomy of the organ as well as the changes in diabetes. The second, by Lahm of Chemnitz, covers the embryology and morphology of the ovaries, uterus, vagina, clitoris, placenta, and mammary glands as organs of internal secretion. This exposition is rather sketchy.

In the first installment of the second volume, there is an article by Asher of Bern on the general physiology of the internal secretions. Next comes the chemistry of the secretions by Guggenheim of Basel, which is a very thorough review in brief extract of this important phase. A large part of this installment is taken up by Asher's physiology of the thyroid which is very thorough and up to date, the final article being by the same author on the physiology of the parathyroid. A very complete bibliography is appended to each article and lends its added value.

Berkeley, in dealing with the *Principles and Practice of Endocrine Medicine*<sup>25</sup> attempts to cover a very difficult field. It takes much courage "to define the actual scientific status of endocrinology today," par-

<sup>23</sup>*Problems of Human Reproduction*. By Paul Popenoe, Baltimore, The Williams and Wilkins Co., 1926.

<sup>24</sup>*Handbuch der Inneren Sekretion*. Edited by Dr. Max Hirsch, Berlin, von Curt Kahlitzsch, Leipzig.

<sup>25</sup>*The Principles and Practice of Endocrine Medicine*. By William N. Berkeley, Ph.D., M.D., Lea & Febiger, Philadelphia and New York.

ticularly as his book is primarily meant for doctors in active practice, who, as the reviewer knows to his sorrow, at once desire to apply the very newest hypothesis to their next patient. I think that the author has shown an honest desire to accomplish his difficult task. He has collected the material with diligence and care but the chapters of his book are very unequal in their exposition. The thyroid, for example, is well and convincingly handled, perhaps because this is the one storage gland and the one endocrine preparation which is really satisfactory. In the parathyroid, much too much has been taken for granted even though the author does not show an undue amount of credulity. On the whole, Berkeley shows a healthy amount of scepticism and reserve, quite unusual in books of this character. The weakest chapter is the one on the gonads in which the newest and most striking acquirements of the last years hardly have been touched upon. If the general practitioner insists upon having a book dealing with endocrine therapy before the pharmacologist is able to offer satisfactory products, this book is certainly to be recommended, as it attempts a really impossible task with some degree of conservatism and discretion.

#### PATHOLOGY; SURGERY

*Human Pathology* by Karsner<sup>26</sup> is a textbook for the general practitioner and student in which the author desires to emphasize, as all modern pathologists want to do, the functional aspect of disease. The entire field is covered adequately. The text is clear, clean cut, and terse. It is at times a trifle too impersonal to fully carry its message. The illustrations are excellent. This applies equally well to the gross and microscopic specimens. The latter are neither so diagrammatic as to be unusable for comparison with actual slides, nor so overdetailed and "artistic" as to be bewildering. The bibliographies at the end of each chapter, although far from complete, have been selected, in most instances, with considerable judgment, so as to give those interested at least some guidance as to where to look up a subject in greater detail. Why the author classifies melanoma under sarcomata I do not grasp. The classification of kidney diseases is very involved. As happens in every first edition, there are certain omissions which we hope will be taken care of in subsequent revisions of the work. On the whole, this is a very satisfactory book ranking with some of the best known textbooks dealing with this subject in the English language.

"The surgery of today is based on pathology." With this introductory remark of Boyd to his *Surgical Pathology*<sup>27</sup> no one can disagree. That this pathology should be that "of the living" is also true. With this viewpoint in mind, the author has attempted to cover, with only partial success, the pathology of the entire body. He is very good and clear in describing new theories in simple, understandable terms. I will instance Dreyer's work on the selective effect of stains on bacteria, the healing of wounds as described by Carrel, the modern theories dealing with cancer. On the other hand, Boyd shows an undue inclination to base many points of his pathology on the as yet much disputed work of Rosenow, of Rochester, Minnesota, dealing with the selective localiza-

<sup>26</sup>*Human Pathology*. By Howard T. Karsner. Introduction by Simon Flexner, M.D., Philadelphia, J. B. Lippincott Co.

<sup>27</sup>*Surgical Pathology*. By William Boyd, M.D., M.R.C.P.Ed., F.R.S.C., Philadelphia and London, W. B. Saunders Co.

tion of various strains of bacteria. Throughout the influence of the Mayo Clinic as well as of the English School is felt. It is of distinct value to the American physician to have both of these points of view stressed.

In my opinion the author has failed to demonstrate in given cases the applicability of the pathologic findings to the condition with which the physician has to deal. This is a difficult task but would serve to elevate the book from mediocrity to real permanence and usefulness. I cannot agree with the author that the seriousness of "septicemia" depends largely upon whether secondary foci of inflammation are set up in distant parts. In fact, in certain cases of "bacteremia," which I think is a preferable designation, the recovery of the patient dates from the time that localization takes place. Again in the interpretation of chronic metritis and fibrosis uteri where only in the final line attention is drawn to the ovary as the cause for the intractable hemorrhages of puberty, the gonad should have the leading motif in the entire discussion of so-called "chronic metritis" and "fibrosis." The illustrations are not good, and the references for further study are too scant as well as not sufficiently representative to be of much value.

A mellow, short book for the general practitioner has a misleading title. Instead of being called *Abdominal and Pelvic Surgery for Practitioners*<sup>28</sup> it should be the "Diagnosis of Abdominal and Pelvic Conditions for Practitioners." Morison began his activity at the time when the sole choice lay between castor oil and opium. Today, he says "the chief cause of death at the present time is, and always has been—*delay*." He claims that thousands of lives are annually lost from abdominal injuries and diseases, because operation has not been done in time to stop hemorrhage, to prevent or arrest sepsis, or to remove the focus of the disease. In his introduction, he analyzes the strange anomaly that "though the knowledge and usefulness of the practitioner are enormously greater than those of his predecessors, his prestige has diminished in proportion to the professional advance he has made." He continues, "Patients frequently tell me, when asked who is their doctor, that they have none, but when ill they consult specialists . . ." "Operators are like golfers. Many can play at golf after prolonged instruction and practice but *few* can ever play golf. There are *many* operators, but *few* surgeons" and he predicts " . . . that the time is ripe for 'the doctor' to come into his own again, by realizing his responsibilities in the way I have proposed—as the guide and friend of his patient." To make his point, and he makes it very successfully, innumerable short histories of concrete cases are given covering the entire field of abdominal and pelvic surgery. It is a most valuable little book; although elementary it is fundamental and can be read with enjoyment and profit by the most instructed.

To those of us doing surgery in the Zone of the Advance in 1918, Tarnowsky's book<sup>29</sup> would have been an invaluable boon. He has written this "Military Surgery of the World War adapted to Civil Life" and it will prove of extreme value to the industrial surgeon. Any one interested in drawing deductions from the tremendous surgical expe-

<sup>28</sup>*Abdominal and Pelvic Surgery for Practitioners.* By Rutherford Morison. Humphrey Milford Oxford University Press, London.

<sup>29</sup>*Emergency Surgery. The Military Surgery of the World War Adapted to Civil Life.* By George de Tarnowsky, M.D., Lea & Febiger, Philadelphia and New York, 1926.

rience acquired during the World War will do well to look on page 21 where, under twelve short captions, the author sums up the main contributions and improvements. The industrial worker of today is probably unaware of the huge amount of benefit he has derived from the experience gathered at the front, and the yearly army of industrially maimed has an increasing number returning to active work and health through the lessons learned. I hope that the next edition of this valuable treatise will feature anatomy even more than the present edition, because I know from personal experience in France, that many simple poster-like charts of the human anatomy are worth more than pages of text which, when in a hurry, no one consults or reads. In such a book, also, the changes in anatomy due to hematoma or distortion by trauma should be illustrated rather than the normal anatomy of a region.

In commemoration of the seventy-fifth birthday of a beloved and venerated colleague, the members of the Liverpool Medical Institution have published the selected papers on Surgery and Pathology of F. T. Paul.<sup>30</sup> These papers which start in the year 1881 and extend to 1913, give an outline of the varied activities of this well-known surgeon whose chief claim to recognition lies in the simplifications of intestinal surgery connected with his name. The simple clear articles are as modern today as when published, some of them nearly fifty years ago. The intense interest which Paul evinced for pathology is reflected throughout the book which touches on such diverse subjects as the reasons of syphilis, goiter, the histology of dentine, and the degree of malignancy of epithelioma. The technical articles dealing with the intestine are so well known that they are referred to by every surgeon.

Consistent with its policy of isolation, the United States depends upon volunteer participants to report on the Third International Congress of Military Medicine and Pharmacy<sup>31</sup> which was held in Paris, April, 1925. The proceedings were published by Bainbridge, in *The Military Surgeon*.

The subjects dealt with were those of technical specialization; the selection from troops of the tuberculous; the etiology and treatment of traumatic arthritis; and finally an analysis of dressing and suture material. It would be well for all of the medical profession interested in military surgery to look over this concise report.

#### PEDIATRICS

The second edition of Levinson's *Examination of Children by Clinical and Laboratory Methods*<sup>32</sup> is an exceedingly well compiled small textbook dealing with all the methods in vogue for the examination of children and their interpretation. The student will find it an excellent guide to use in connection with his practical and laboratory work, while the practitioner will rely upon it in making all the examinations necessary in pediatrics.

In the future, books dealing directly with infancy or any pediatric subject will be turned over to the department of pediatrics of our jour-

<sup>30</sup>Selected Papers, Surgical and Pathological. By F. T. Paul, Bailliere, Tindall and Cox, London, 1923.

<sup>31</sup>Report on Third International Congress of Military Medicine and Pharmacy, Paris, 1925. By Commander Wm. S. Bainbridge. Washington, D. C., 1926.

<sup>32</sup>Examination of Children by Clinical and Laboratory Methods. By Abraham Levinson, M.D., Ed. 2, The C. V. Mosby Co., St. Louis, 1927.



nal. However, before taking this radical step, I confess to having read with enjoyment especially the preface of Morse's *Clinical Pediatrics*.<sup>33</sup> The introduction is refreshingly naive, if I may apply this somewhat doubtful term to the utter truthfulness of maturity instead of to the callowness of youth. I shall be proud if ever I have the courage to start a book of my own with the preface "this book was written primarily for my amusement" and adding "I have not attempted to give detailed descriptions of microscopic pathologic changes, which I should have been compelled to copy from some other book and which I would not recognize if I saw them. Moreover," the author continues ". . . I have written most about those diseases concerning which I felt I knew most or was most interested in . . . ." In spite of this introduction, the reader will find that almost every pediatric subject has been adequately covered without pretense but with thoroughness, and that the five senses are still trusted in helping to make a diagnosis. Even the "sixth sense" which I think Dr. Oliver Wendell Holmes called common sense, is also appealed to. The reproductions of illustrations are surprisingly poor either because the paper is not of good enough quality or because the photographs are underexposed. In spite of the author's disclaimer none of the modern methods of diagnosis have been overlooked in the treatise.

*Nervous and Mental Disorders from Birth through Adolescence* by Sachs and Hausman<sup>34</sup> is an entirely rewritten volume based on the well-known earlier work of the senior author, called *Nervous Diseases of Children* which appeared more than two decades ago. Part one, by Hausman, is a short but very well-preserved outline of the structure of the nervous system in its relation to function, as well as the current methods of neurologic examination needed to establish a diagnosis. Part two deals with the organic diseases of the nervous system, covering every phase, from those diseases dating from antenatal conditions, birth injuries, through early childhood to adolescence. To attempt even an outline within the space at my disposal, would reduce this review to a mere index of the book. The infectious brain diseases, such as anterior poliomyelitis, epidemic cerebrospinal meningitis, epidemic encephalitis are very well presented. This as well applies to the chapter on epilepsy, speech disorders, and disorders of sleep. Endocrine diseases are dealt with in a very sane, but somewhat sketchy, fashion. I would have liked to have had Sach's experience with herpes zoster and herpes simplex recorded in much more detail, as our knowledge of the significance of these diseases is still in the making.

My greatest interest was concentrated on that portion of the book dealing with mental disturbances in which I was interested to see the viewpoint expressed by Sachs upon the disorders usually handled by the psychoanalyst. Chapter thirty-one on the normal child, the normal youth, development and training is admirable, well balanced, and sane. The author says that training is more important than heredity, that the nervous mother is more often at fault than the child, that in spite of Freudian teachings, the mother should continue to care for the child, that obedience should not be considered an obsolete virtue, that "our

<sup>33</sup>*Clinical Pediatrics*. By J. L. Morse, M.D., W. B. Saunders Co. Philadelphia, 1926.

<sup>34</sup>*Nervous and Mental Disorders from Birth through Adolescence*. By B. Sachs, M.D., and Louis Hausman, M.D., Paul B. Hoeber, Inc. New York, 1926.



entire social organization is based upon respect for authority," that character comes first, taking precedence over knowledge. He insists, and there I believe an increasing number of thoughtful medical men will agree with him, that Freud and his followers have overemphasized sex. "Granted" says he, "that the psychoanalyst has developed a 'technic' which abets his purposes, the psychologist and psychiatrists of former days were also in the habit of analyzing mental processes by seeking the original psychic symptoms and by endeavoring to ascertain the causes that led to the development of nervous or mental phenomena. *The great difference, however, was that we did not insist that some sexual irregularity must be the cause; we were taught by experience that family feuds, business reverses, the death of a dear relative, a serious disappointment in love (not always a purely sexual emotion) were common causes.*" (*The italics are mine.*) He emphasizes that by Freud everything is reduced to sex, that infantile libido, the Oedipus Complex, and similar striking catch words have been worked to death. He justly says that "... the trouble with the Freudians is that they insist that your mind is always filled with nasty thoughts or that you are trying to hide something." While Sachs is somewhat overrabid in his antagonism to the present craze, I believe, after having watched the growth and decline of innumerable medical fads, that his point of view will be fully justified within the next ten years, after a certain section of the laity has exhausted its keenest enjoyment of some phases of Freudian teachings. Then the real enlightenment ascribable to Freud's theories will receive their proper recognition and evaluation.

#### ELECTRICITY; RADIOTHERAPY; MISCELLANEOUS

Dr. Morgan<sup>35</sup> has written a small descriptive book treating of electrothermic methods which include electrodesiccation and electrocoagulation. Descriptions of electricity, history, and apparatus are extremely nontechnical and too elementary. The actual technical review of the method is satisfactory and on the whole gives a somewhat overenthusiastic account of the value of these methods.

Another book on x-ray is edited by Prof. Hans Meyer of Bremen,<sup>36</sup> a textbook of radiotherapy of which the third volume has been sent for review. This deals exclusively with x-ray therapy in internal medicine. Apparently this form of treatment is being very widely used not only in diseases of blood and hematopoietic organs but especially in all types of tuberculosis, in exophthalmic goiter, the intestinal tract, and even in bronchial asthma. Why hypophysis and mediastinal tumors are described in this connection is not clear to me. Such diverse diseases as hyperacidity, neuralgias, chronic arthritis and erysipelas have been subjected to the effect of rays. The effects of radioactive substances and ultraviolet light, are discussed as well as diathermy. A large chapter is devoted to the treatment of diseases of children.

For our circle of readers the fourth volume when forthcoming, which deals with therapeutics of gynecology, will be of more vital interest.

<sup>35</sup>Electrothermic Methods in the Treatment of Neoplastic Diseases. By J. Douglas Morgan, M.D., Philadelphia, F. A. Davis Co., 1926.

<sup>36</sup>Lehrbuch der Strahlentherapie. Band III: Die Strahlentherapie in der Inneren Medizin. Edited by Prof. Dr. Hans Meyer, Urban & Schwarzenberg, Berlin, 1926.

The second volume of the *Medizinischen Strahlenforschung*<sup>37</sup> (previously discussed in our review of January, 1926) has now appeared. The promise of the first volume has been fully kept up both as to the excellency of the format as well as to the contents. Of especial interest to the gynecologist and abdominal surgeon are roentgen effects on duodenal ulcer by Berg of Frankfurt; the influence of the short wave length upon the acid and base equilibrium of the body and especially that of the blood by Kroetz of Greifswald; the endovesicle electrocoagulation by Seheele; and finally the results of experimental exposure of the ovaries to the rays by Geller of Breslau. This author believes that exposure of the ovaries to the rays may produce at a later date defective children or monsters, although this likelihood is greatly reduced by the fact that such damaged ova usually are aborted early during pregnancy. He has demonstrated that small doses may stimulate the ovary because the partly atretic follicles are destroyed by the rays and therefore allow normal ovulation to take place. As I said when reviewing the previous volume, this handbook will prove of utmost use to all branches of the medical profession.

Of the diversified contents of this volume<sup>38</sup> of *International Clinics*, the following titles should interest our readers—A Summary of the Present Knowledge of Vitamins and Their Therapeutic Importance, by N. P. Norman; Acidosis and Alkalosis in Infancy and Childhood, by J. H. Hess of Chicago; the articles dealing with travel in Italy; and in conclusion, the biography of Sir Clifford Allbutt, written by Rolleston.

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<sup>37</sup>*Ergebnisse der medizinischen Strahlenforschung*. Edited by H. Holfelder. H. Holt-husen, O. Jüngling, H. Martius, Vol. 2, Georg Thieme, Leipzig, 1926.

<sup>38</sup>*International Clinics*. Volume III, Thirty-sixth series, 1926. J. B. Lippincott Co., 1926.

## Books Received

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MOTHER AND UNBORN CHILD, By Samuel Raynor Meaker, associate professor of gynecology, Boston University School of Medicine. With 22 illustrations. The Williams & Wilkins Company, Baltimore, 1927.

KOMPENDIUM DER GEBURTSHILFE. Von Dr. Walther Hannes, Professor an der Universitaet in Breslau. Zweite, neubearbeitete Auflage. Mit 160 teils mehrfarbigen Abbildungen. Urban und Schwarzenberg, Wien, 1927.

L'HYSTERECTOMIE SUBTOTALE OBLIQUE. Par Martin Gomes, professeur, chirurgien de l'hôpital Santa Casa. Barcellos, Bertaso & Cia, Porto Allegre, Bresil. 1927.

BIRTH, STILLBIRTH, AND INFANT MORTALITY, for 1924. Tenth Annual Report, Washington, Government Printing Office, 1926.

DIE UNFRUCHTBARKEIT DER FRAU. Von Dr. Erwin Graff, Professor der Geburtshilfe und Gynaekologie, Universitaet Wien. Verlag von Julius Springer, Wien, 1926.

HANDBUCH DER INNEREN SEKRETION. Herausgegeben von Dr. Max Hirsch, Berlin. III. Band, Lieferung i. Verlag von Kurt Kabitzsch, Leipzig, 1927.

OPERATING ROOM PROCEDURE for nurses and internes. By Henry C. Falk, assistant attending surgeon at the French Hospital, etc., etc. With a foreword by Eugene H. Pool, professor of surgery, Columbia University, etc. With 275 illustrations. G. P. Putnam's Sons, New York, 1925.

THE PHYSIOLOGY OF THE CONTINUITY OF LIFE. By D. Noel Paton, Regius Professor of Physiology, University of Glasgow. McMillan and Co., Lim. London, 1926.

INTERNATIONAL CLINICS. Volume IV. Thirty-sixth Series, 1926, J. B. Lippincott Company, 1926.

TRANSFUSION OF BLOOD. By Henry M. Feinblatt, Assistant Clinical Professor of Medicine, the Long Island College Hospital, Brooklyn, N. Y., etc., etc. Illustrated by 24 engravings. The Macmillan Company, New York, 1926.

DE LA CONTRACTION UTERINE et des dyseinesies correlatives. Par L. A. Demelin, accoucheur honoraire des Hopitaux de Paris, etc. Avec 16 figures dans le texte. Librairie Octave Doin, Paris, 1927.

BIOLOGIE UND PATHOLOGIE DES WEIBES, herausgegeben von Professor Josef Halban, Wien, und Professor Ludwig Seitz, Frankfurt. Lieferung 30. Verlag von Urban und Schwarzenberg, Wien, 1926.

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## Original Communications

### THE APOSTLE OF CASUISTRY IN MEDICINE

#### AN IDEALIZATION OF THEOPHILUS PARVIN

BY GEORGE CLARK MOSHER, A.M., M.D., KANSAS CITY, MO.

*(Presidential Address, The American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Thirty-ninth Annual Meeting, 1926)*

TO THE youth who first essays his entrance into the practice of any branch of medical science ever comes the vision of some one man, an outstanding character and an influence, which has to do with his future career. Such an impression was made upon me, while a neophyte in physics by Theophilus Parvin, who was, in my student days, at the zenith of his career as a teacher.

Theophilus Parvin stood out as a classicist and a philosopher as well as a teacher and an operator. His imprint endures through medical history because he touched upon so many subjects, and with such brilliant skill, that his conclusions must be preserved for all time in our literature.

One needs select carefully the small number of the world's obstetricians whose names are to be mentioned with his; John Hunter, Meigs, Playfair, Tarnier, Madame La Chapelle, Von Winckel, Simpson and Blundell. To include those of the present day would invite invidious comparison.

No man in either hemisphere has been more widely recognized for his contributions to the subject of obstetrics than Theophilus Parvin. A glance at the Index Catalogue of the Surgeon General's office will reveal the vast energy and industrious application of the student and the investigator anxious to share the treasures of his discoveries with his brother practitioners. Dr. Parvin left a deep impression on every group that he met.

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NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

It is an interesting fact that in each of the teaching centers where Parvin was formerly the presiding genius, the present professors are Fellows of this Association: in Indianapolis Dr. Pfaff, Dr. Pantzer, Dr. Edward Clark, and Dr. Mendenhall; in Louisville Dr. Frank and Dr. Speidel; in Cincinnati Dr. Bonifield, Dr. Tate, and Dr. Hall; and in Philadelphia our newly-welcomed Fellow Dr. Brooke Bland. Many interesting letters have been received from these Fellows in answer to inquiries regarding Dr. Parvin's history and his work; and in addition it is fitting to mention Dr. Wm. M. Wishard of Indianapolis, and Mrs. James P. Baker, the only daughter of Dr. Parvin, who have furnished facts and anecdotes concerning his career. It is regretted



THEOPHILUS PARVIN  
The Apostle of Casuistry

that these letters cannot all be included. This grateful acknowledgment is made to all our friends for the assistance they have afforded.

Theophilus Parvin was born in 1829 in Buenos Aires, South America, where his father the Rev. Theophilus Parvin was stationed as a missionary. His mother was the daughter of Caesar Augustus Rodney, who was Attorney General of the United States under Jefferson and Madison. She died when he was two weeks old, and the father brought his child back to this country but he died when young Theophilus was seven years old. Parvin entered Lafayette College at the age of twelve, and finished his academic career in the University of Indiana in 1847. He studied Hebrew and Greek at Princeton; received his Master's degree in 1850, and his M.D. from the University of Pennsylvania in 1852. He spent two years as surgeon on a packet line sailing between Philadelphia and Liverpool. Parvin then

successively filled the chair of *Materia Medica*, in Ohio Medical College, 1855 to 1864, and that of Obstetrics and Diseases of Women, University of Louisville to 1869. In 1876 he became Professor of Obstetrics in the College of Physicians and Surgeons in Indianapolis. In 1882 he was recalled to the University of Louisville and in 1883 accepted the chair of Obstetrics and Diseases of Women in Jefferson, also being obstetrician in the Philadelphia Hospital. He was co-editor, with Roberts Bartholow, of the *Cincinnati Journal of Medicine*, 1866-67; editor of the *Western Journal of Medicine*, 1868-69; and co-editor, with Yandell, of the *American Practitioner*, Louisville, 1869-83. In going over the bibliography one is struck by the myriad of medical contributions and the varied topics upon which Parvin wrote, always in an entertaining and most illuminating style.

His textbook, the *Science and Art of Obstetrics*, which ran rapidly through several editions, was one of the three big favorites of the colleges in the 80's; the other two being Lusk and Playfair. Parvin translated the *Diseases of Women* by Von Winckel, and was a contributor to Ashurst's *Encyclopedia of Surgery*, Sajous' *Universal Medical Sciences*, *The American Text Book of Obstetrics*, and the *American Text Book of Therapeutics*. He was successively elected president of the State Medical Society of Indiana, the American Medical Association, the American Medical Editor's Association, the American Academy of Medicine, the Philadelphia Obstetrical Society, and various other national societies. In 1890 he was president of the Obstetrical Section of the International Medical Congress, held in Berlin, where I first met him, toward the close of his memorable career. In 1892 he presided at the International Congress of Obstetrics, in Brussels. A long list of honorary fellowships in foreign societies is attached to his name.

The preserved contributions to current medical literature, including over one hundred and fifty titles, do not comprise all his writings. He must be classed as one of the great men who have illumined the medical profession with their intellectual attainments. His vigorous, well chosen English was a delight. His classical allusions were always apt. Parvin was the embodiment of the erudition which permeated all his writings throughout the thirty years of active professional and teaching career, 1868-1898. Dr. Wm. H. Parish, who wrote Parvin's obituary for the *Journal of the American Medical Association*, said: "Theophilus Parvin's career as the master obstetrician of America is familiar to the medical profession. During the last quarter of the nineteenth century he ranked, undoubtedly, among the great living authorities in medicine." His classical textbook in obstetrics, which was enthusiastically received by the profession, occupied the same position among obstetric books, that Samuel D. Gross' monumental work did among surgical books; that Sir Thomas Watson

and Trousseau did in medicine and Roberts Bartholow's *Materia Medica* did on the subject of therapeutics.

Dr. Parvin established, in 1889, the first maternity department of any hospital in America, at Jefferson College, following the method of Professor Winckel at Munich. Thirty-four confinements, without a maternal death, were attended and in the out-patient department 151 cases were cared for with but one death, cause unknown.

In making a report of this enterprise before the New York Academy of Medicine, Parvin appealed to the Academy as the organization which should, by promoting the establishment of this system of clinical obstetrics as a part of the regular curriculum in the medical schools of the country, set a light to guide the profession of America. In view of the importance of the proposed reform, he urged that every college which refused to take this step should be condemned to perish by common condign condemnation. Strange as it may seem, we are today appealing, without any penalizing, to the colleges to institute this same reform in the teaching of obstetrics.

Parvin's initiatory work blazed the trail for us, and in the best medical schools today obstetrics is appreciated as one of the major branches of instruction. It will be remembered, however, that Dr. Rowland's investigation, reported to the American Medical Association last year, showed that, as compared with surgery, obstetrics in the last two years of the course in the average medical school is assigned four hours a week, while surgery has eighteen hours.

Parvin's discussions were always dignified, considerate and courteous, even when he disagreed with his confreres. One is struck with an instance of this published in the *Report of the Proceedings of the Philadelphia Obstetrical Society*.

Dr. Parvin had brought back from Europe an axis-traction forceps, which he exhibited to the Society. In the discussion which followed, Dr. William Goodell, gynecologist of Parvin's alma mater, the University of Pennsylvania, said he did not have much interest in the new fangled axis-traction principle, then being advanced by Tarnier in Paris and Simpson in Edinburgh. He said that he had often suffered backache during a high forceps delivery, until he devised an apparatus of his own, which he proceeded to illustrate. This consisted of a leather strap, reaching from the side of the delivery bed to the floor, to which he had sewed a saddle stirrup at one end, and the other end he tied to the handle of his forceps. His foot in the stirrup and the heel on the floor, the weight on the handles was directed by the ball of the foot, which furnished the *vis a fronte*, and thus saved his back. Turning to the illustrious Joseph Price, one of our founders, Dr. Goodell remarked, "You may have seen the apparatus hanging on the gas fixture, at Preston Retreat, Dr. Price." Price, in his laconic

fashion, replied, "Yes, I have seen it." Dr. Parvin made no comment on the labor-saving device of his distinguished fellow professor.

Three of the philosophic essays, which Parvin presented a third of a century ago, analyzing many current problems, are a most interesting study. Some of his conclusions are now anachronistic; in others he was, in his vision, far ahead of his generation. These three were his addresses entitled, "The Genius of Medicine," "The Woman and Her Physician," and "The Casuistry of Medicine."

"The Genius of Medicine" was made the topic of an elaborate address by Parvin at Louisville in 1883. He took as his theme Conte's definition of a science, as "Knowledge which enables us to see and to foretell results." Parvin said in substance, "Let any case of common disease be examined by half a dozen educated physicians; there would be in almost every instance an exact agreement as to the nature of the malady, its progress and the means advisable to eliminate it, or to shorten its course. The natural history of disease is so well known that the physician can, in the majority of cases, foresee and foretell it."

"It is not essential to science that it be at any given time complete or free from error. It is called science in reference to the aim and method of the intellectual process of which it is the result, not in reference to its own absolute correctness and completeness.

"The certainties in diagnosis and prognosis of disease in recent years add to the just claim of medicine to be considered a science.

"The remarkable fact regarding remedies has always been that the great masters have used but few medicines. Hippocrates set the shining example. Sydenham said, half in jest, that he could carry all the drugs that he needed in the head of his cane. Boerhave in his day said that the enlightened physician could practice medicine with opium, cinchona, mercury, salts and water. Hoffman, of the famous anodyne, however, must rejoice had he lived today, and recant his famous declaration of scepticism, '*Fuge medicos et medicamenta, si vis esse salvus.*'"

While rejoicing in the important position of medicine, the student must not forget, declares Parvin, that the foundations of our science were laid and the form of the superstructure largely directed by Hippocrates, the noble Greek who stands among physicians as Alexander among warriors, Homer among the poets and Plato among the philosophers.

Greek medicine, however, Dnremberg asserts, which was the origin of the medicine of today, came not from the temple nor from the gymnasium, but from the laboratory of the physician. Parvin asserts that the medicine of Homer is very human in that he observes that, between the medicine of the gods and of Hippocrates, true medicine lived without eclipse, just as it existed in his own day with mesmerism



and spiritualism, and we may add in our present day with Christian Science, osteopathy, chiropractic and all the other cults.

Aesculapius, who was reputed able to restore men to life, was promptly suppressed by one of the thunderbolts of Jupiter. The moral of which, Parvin points out, is that doctors should let the dead stay dead, influenced as much by the fate of Aesculapius as by the reason which Moliere has put into the mouth of Sganarelle, "The best of the medical profession is that there is the greatest honesty and discretion among the dead, for you never find them complaining of the physician who killed them." Or as a modern Kansas City undertaker advertises in the street cars, "Twenty-seven years of perfect service, without the complaint of a single patron."

Hippocrates did much to emancipate medicine from the superstition and charlatanry of the primitive peoples who preceded him. He taught that pathology was a part of physiology; he urged the importance of careful clinical observation, and Parvin asserts that he separated the true from the false. He set down a narrative of the special cases of his patients, and how they were judged by recovery or death. Parvin claims that Hippocrates diagnosed puerperal septicemia and shows that the man whom Galen termed the greatest of physicians and the first of philosophers, observed facts 300 years B.C. which we are rediscovering today. Parvin characterizes his genius, grave, wise, charitable, careful of the dignity of his art, always avowing his powerlessness, a sagacious observer endowed with exquisite medical sense, judging phenomena in their connection, he ascribed to medicine the form which has triumphed over all the ages. He quotes the words of Chauffard, "Primordial truths are the autonomy of life, the unity of existence, its spontaneity and finality." These principles were the source of Hippocratic medicine.

One of Parvin's best remembered orations is that in which he discusses woman and her physician. Briefly referring to some of the more obvious physical differences between woman and man, Parvin, quoting from Moreau, in his *Natural History of Woman*, says, "These differences, the general delicacy of muscles and the elegance and beauty of form, belong to the essential nature of women. Education and habits of life may increase these characteristics, as Hippocrates was forced to avow. Nevertheless, there remains a radical, innate difference in structure which will be found in all countries, and among all peoples."

Parvin said, "Beauty is one of the most common of woman's physical characteristics. Age, disease, poverty, suffering, ignorance, the play and power of evil passions, wicked habits may mar or destroy the beauty, not in a single individual only, but in those deriving their origin from her. Nevertheless, this gracious gift is the general possession of the sex."

In the twenty-fourth ode of Anaereon, the Greek poet, wherein he speaks of nature having given to all that breathe the air of heaven some boon, wreathed horns to the bull, the hoof of strength to the steed, speed to the timid hare, Parvin found the following apostrophe to woman. This was quoted to Dr. Speidel from memory by Dr. Wm. B. Doherty, of Louisville, now eighty-four years old, and who was in 1870 a friend and contemporary of Parvin, on the faculty of the University of Louisville.

To man she gave in that proud hour  
 The boon of intellectual power.  
 Then, what O woman! what for thee  
 Was left in Nature's treasury?  
 She gave thee beauty—mightier far  
 Than all the pomp and power of war.  
 Nor steel nor fire itself hath power,  
 Like woman in her conquering hour.  
 So be but fair, mankind adores thee,  
 Smile, and a world is weak before thee!

Dr. Parvin's motive in this address was to emphasize the peculiar type of the relation between the sexes, and the delicacy needed to be used in the practice of gynecology and obstetrics as contrasted with the other phases of medicine. He took up the questions of confidence and esteem growing out of this intimate experience, and emphatically expressed his opinion that the great profession as a body is on the highest plane as regards morals.

With one of his apt classical quotations he shows the other side of the picture, the small number of physicians who fail to measure up to this high standard. The eagle which stole the meat from the altar of the gods and flew home to its nest with its prey, carried with it a coal of fire, which soon consumed the nest and the young eaglets.

Parvin says that the physician who enters the home of virtue with any but the purest sentiments will sooner or later perish like the eagle's nest.

The great effort Parvin made in the essay entitled "The Casuistry of Medicine" seems to me to be entitled to more extensive consideration because it is as pertinent in its application today as when written. In this essay Parvin presents the problem that dominates all philosophy, all science and its application to art, not only in the ordinary relations of life but to us, specifically, through the evolution of medicine, from that of Aesculapins and Hippocrates down to our own myriad of specialties—the problem of right or wrong in a debatable decision.

The word casuistry was first applied to the discussions of the theologians, especially the famous order of Jesuits, occupied in solving questions of conscience. The word fell into disrepute because of

certain alleged abuses of this method of reasoning. Casuistry is popularly interpreted as meaning sophistry; that is, subtle and dishonest reasoning. Parvin interpreted it by its original classical meaning, the application of ethical principles to questions of conscience and judgment.

We are reminded that, forty years ago, Dr. Fairchild, president of Oberlin College, was asked by one of his students in his course of lectures in Moral Philosophy, if a lie were ever justifiable. The Professor answered, "No, but let us first define a lie. A lie is an untruth told maliciously and designed to somebody's hurt. An untruth told by a physician to a patient saying he is better, even if a question might exist as to the exact fact, is not a lie, as it is told for the well being, not the injury to the patient."

John Galsworthy, in *Saint's Progress*, discussing the pragmatism of Henry James, makes James justify the assertion of one of his characters, "That what we do is not wrong until it is proved wrong by the result."

Parvin said that Zoroaster gave as one of the best guides in making human conduct correspond to the claims of conscience, this maxim, "In doubt as to whether an action is right or wrong, abstain." Parvin advises that, admirable as is Zoroaster's rule, it may fail of adaptation in many of life's emergencies. Its light may go out and leave us in darkness. Not to resolve may be to resolve. We may be compelled to do one of several things, being unable to fold our arms and reject all because we do not know which is best. This is true in obstetrics as much as in any branch of medicine.

DeQuincy said that the necessity of casuistry can be deduced from the very origin and genesis of the word, casus, a case. It is really the science of cases.

After morality has done its very utmost in clearing up the ground upon which it rests its decisions, after it has multiplied its rules to every possible point of circumstantiality, there will always continue to arise cases without end, in the shifting combination of human action, about which a question will remain if they do, or do not, fall under any of the rules.

The best way of seeing this truth illustrated on a broad scale, the shortest and most decisive, is to point our attention to one striking fact, namely, that all ethics and all law in every civilized land are based on casuistry. Parvin explains that casuistry does not seek the evasion of the law nor compliance with the letter while the spirit is violated.

Science is perpetually propounding questions in casuistry or demanding new answers to old ones. This is true in medicine. In medicine, also, the elements of time and place are often concerned in the responses to casuistic questions. The moral philosophers were con-

tinually presenting problems in casuistry. Parvin says it is certainly discouraging, seeking universal and immutable foundations for morals and therefore immutable and universal laws for the government of human conduct, to find the same questions answered in different manner by different people in different ages.

The elder Cato was asked what he thought of usury. He replied, "What do I think of murder?" But today most enlightened people regard usury as just and right.

Pascal's words, "In the just and the unjust we find hardly anything which does not change character in changing climate," cannot be denied as expressing at least a partial truth. "The degree of elevation of the poles reverses the whole of jurisprudence. A meridian and a few years of possession decide the truth. Fundamental laws change. Right has its epoch; a pleasant justice which a river or a mountain may limit. Truth this side the Pyrenees, error on the other."

Obstetric art offers many illustrations of the points made by the great French philosopher. When gastroclytrotomy was proposed by Gailliard Thomas, Fordyce Barker said publicly if the value of the operation was established it would be necessary to restudy the whole subject of obstetric ethics. Winekel, with the majority of Europeans, said the operation had no future. Porro's operation, which Parvin remarked was originally almost exclusively the technic of Italian gynecologists, is now recognized as a most beneficent measure where it is properly indicated.

A question of casuistry is offered when in the course of a case of pregnancy albuminuric retinitis is discovered by the ophthalmologist. He announces to the obstetrician that the vision and perhaps even the life of the pregnant woman is imperiled by the continuance of her pregnancy. What answer is to be made? What course shall the obstetrician pursue?

Even in Parvin's time the cult of birth control was beginning to grow throughout the world. He says, "Means of preventing conception in married women are known to physicians. Admitting his knowledge of the means of contraception, shall the doctor inform married men and women of the means? The knowledge given in these cases in which it may seem necessary is not kept secret by the immediate recipients, but will be imparted to others who have no just excuse for the avoidance of child bearing. The knowledge will become general, and thus a strong defense to the virtue of woman is taken away and the purity of countless lives and the peace of countless homes is sacrificed to man's selfishness."

Parvin says one has no right to put into the hands of another a loaded pistol, when it is probable he will use it for homicide or sui-

cide. We are morally responsible for imparting knowledge which we know will be used for evil.

The recognition of this law by Galen was commended by the illustrious Sir Thomas Browne, in his *Pseudoxica Epidemica*, "We commend the wisdom and goodness of Galen who would not leave unto the world too subtle a theory of poisons, unarming thereby the malice of venomous spirits, whose ignorance must now be contented with sublimate and arsenic."

Parvin says that laws are frequently so made that much is conceded to human weakness; that the standard of legal enactment is not formed for perfect beings, but brought down to the level of the intellectual and moral development of its subjects. Even Divine law has stooped to the moral imperfection of man, since the Great Teacher asserted to the Jews that the conditions of divorce were lowered by Moses on account of the hardness of their hearts.

Moreover, let it be recognized that frequent childbearing is in some women the cause of rapidly failing health and strength. Children come faster than the means to properly care for them is acquired. Infants are born with feeble organization, or hereditary taint, and as time goes on they may prove defective in mental power or of moral bad character, so that one may be tempted to say better had he never been born, or better dead than living. Nevertheless, all the condescension of law acknowledged and these conditions of fact admitted, and even though we may not believe that the back is always given the strength to bear its burden, or the wind is tempered to the shorn lamb, Parvin argues that the physician takes a great responsibility who endeavors to thwart the law of nature, "Lex, lex, dura sed lex." If there be an instance where the physician should impart such knowledge it should be exceedingly rare, and the nicest casuistry is necessary.

Dr. E. H. Forbes, of the Pennsylvania State College, in an address at the American Institute of Politics, Williamstown, Mass., August, 1926, made a statement that the world's population is increasing more rapidly than the quantitative food supply, and he predicted that the problem of the nutrition of the world must be solved in one of three ways: by starvation, by war, or by the attainment of a level between births and deaths at an equilibrium which will adequately provide for variation in food production.

That there can be any immediate need of the application of the Malthusian law even within several centuries is the conclusion of some of our most distinguished statisticians like Dr. Dublin of the Metropolitan Life Insurance Company, who, in an address at the recent Birth Control Congress, in New York City, argued against the economic necessity of the propaganda as not being for our generation.

The Census Bureau shows that our native stock of New England has an average of far less than the four children to the family, which

it is claimed necessary to conserve our birth rate. Sixty years ago the average family in New England comprised seven children, today there are two children. In other words, birth control as already applied to the United States, forty-five years after Parvin's warning words, is resulting in the gradual extinction of our old New England and Virginia colonial families, while the more precocious Middle Europeans with ten children to the family will in a few generations constitute numerically the first families of the nation. Birth control is a doctrine which applies to the wrong element of the population.

The question of birth control in its effect on the health of women is presented by Dr. G. W. Kosmak in his thoughtful discussion of "Birth Control Propaganda and Its Interest to the Physician." He points out that artificial restriction in the early months of married life may produce serious consequences in the woman's pelvic organs and lead to subsequent sterility, or actually hide the presence of this condition, which might have been relieved had its existence been known. We need birth release, not birth control. It is inexpedient to release for the public information without discriminatory precaution which would, in the end, be most detrimental to the community.

Instead of the founding of birth control clinics, where uncertain and sometimes ridiculous contraceptive propaganda is given out, Dr. Kosmak advises that training in sex education should begin in the schools in a healthy, clean study of the matter as a part of biology. Such advice as need be given by the physician, in presence of definite pathologic indications, should be restricted to individual cases as a medical, not an economic, measure.

Forty years ago one of the foremost questions of casuistry was between the operation of craniotomy and a technic designed to save the unborn child. In Parvin's day Lusk had just performed his first successful cesarean, at Bellevue, and the question of craniotomy on the living child was being bitterly assailed by the conservative obstetrician. The enormous maternal mortality in cesarean previous to that time resulted in indiscriminate resort to craniotomy rather than to attempt to deliver the fetus by abdominal section.

Dr. Parvin quotes from Phillips, a distinguished British obstetrician, who in discussing the question of the danger of pelvic contraction which is met by the indication of premature labor, and that in which abdominal section is indicated by the narrow limits of the conjugate in which he would be confined, places a premium on cesarean by restricting craniotomy to a quarter of an inch. The victory for cesarean is thus absolute and craniotomy on the living child is thus condemned by the limitation.

He says, "The question of two women, each having a pelvic deformity such that they could not be delivered of living children but could be safely delivered by craniotomy, is presented. One is very poor

and could not take suitable care of a child, therefore she does not desire one. The other, in comfortable circumstances, desires to have a living child. The question in casuistry arises, Might the obstetrician be guided in any degree by these maternal desires? The direct answer, says Dr. Phillips, is difficult and would vary in different cases. If they be consistent with the course of procedure of the practitioner, the desires of the patient should not be passed over. One is reminded of the answer of the Delphic oracle, 'If Croesus should make war upon the Persians he will destroy a mighty empire.' Encouraged by this reply, he made war upon the Persians, but it was the empire of Croesus, not that of Cyrus, which was destroyed." Parvin concludes that, if consistent with the course of procedure of the practitioner, these desires will not be passed over. But the procedure differs. One operator will perform craniotomy in each case, another will do abdominal section for both patients, while a third may be guided by the maternal desire.

Parvin narrates three cases in which, following craniotomy, the child surviving, after consultation a trepan was used through the opening of the skull into the medulla. This he admits as one of the most painful, serious and difficult questions in the casuistry of obstetrics.

Another type of casuistry of the present day is to be mentioned at this point, a type of casuistry founded not upon the results of research, but upon the assertion of a personal viewpoint wholly illogical and empirical, calling to mind Voltaire's famous declaration: "I give this to you, not because it is the best, but because it is mine."

We revere Lawson Tait for his invaluable work in gynecology, plowing a furrow in a virgin field fifty years ago. I very well recall personally hearing Mr. Tait in Birmingham in 1890, discussing the question of surgical teaching. He said that if he had a son who desired to become a surgeon he would prefer to apprentice him to a carpenter, to learn to use a saw and chisel, rather than to have him study minute anatomy. And speaking of asepsis, in derision of Lister's carbolic spray, he declared he wished he could find a handful of bacteria and throw them into the first open abdomen he incised. He would have no fear of the consequences. The effect of such a declaration upon a young man just out of college, where asepsis was beginning to be taught, can well be imagined. It could never be forgotten.

Regardless of Mr. Tait's brilliant operative skill and his ability as a speaker, we all know that he lived to recognize the delusion into which his casuistry had led him, and to acknowledge the truth of the germ theory. This remark of Mr. Tait is characteristic of a great class of men who today dominate the technical demonstration of surgery.

In the August, 1926, issue of THE AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY, Dr. William P. Graves says: "Many of the problems of conservation that confront the surgeon are met with in patients who have reached or passed the age of maturity, which, with some wide variations, may be set at twenty-two years.

"For the solution of these problems one must adopt a real valuation of the genital organs of the woman. No one will deny that the genital system of the woman was designed by nature ultimately for reproduction. It must be granted, therefore, that it is the duty of the surgeon to follow nature's purpose and, in every way consistent with the patient's health and life, to endeavor to conserve or to restore her reproductive power."

To this obviously righteous doctrine, members of the profession do not react uniformly on account of a difference of opinion as to what constitutes the welfare of the patient. Thus, during an operation a conscientious operator may adopt contraceptive measures which, to another equally discriminating and conscientious surgeon, would be inexcusable. Therein lies the casuistry, the answer to the question of conscientious judgment.

It will be seen by the wide discrepancy shown regarding so many obstetric methods that today we have not yet solved all the problems of casuistry. The individual preference still prevails in so many cases.

Dr. Asa B. Davis is enthusiastic over the Gwathmey synergistic method of anesthesia, and considers it ideal; another obstetrician will use chloroform in labor, another depends on ether, a third on gas oxygen; a fourth selects his cases according to conditions, or starts with scopolamine-pantopon and then resorts to inhalation. This is pure casuistry.

Dr. Bill prefers the Seanzoni rotation for a posterior head; Dr. Potter does his version; a third man relies on the Kielland forceps.

One specialist says, "Once a cesarean, always a cesarean"; another essays to discriminate his cases by a test of labor.

Dr. Polak gives us a vivid picture of his differential method of treatment of cases of ectopic gestation; one technic for the tragic, another for the nontragic; another operator believes in waiting in all cases, while a third will make an emergency of every one.

Whitridge Williams and Eardley Holland depend on the Vorhees' bag in placenta previa; another man will rupture the membranes and attempt accouchement forcé; a third resorts to immediate hysterotomy.

Ross McPherson, with the method of Stroganoff, shows remarkable results of low mortality in eclampsia; Tweedy and the Dublin school are equally insistent on the statistics developed by the use of the elimination technic.

Dr. Titus and his associates demonstrate that glucose and insulin



in vomiting of pregnancy and other types of toxemia give results superior to the methods heretofore recommended; another group makes equally strong claims for magnesium sulphate.

All these varying methods of technic are matters of conscience and judgment, dependent upon individual skill in their use, and the ethics which determines them is pure casuistry, just as real in its application today as were the teachings of Hippocrates and of Galen, or those of Oliver Wendell Holmes and Theophilus Parvin in the time in which they lived.

All of which goes to show that medicine, while it is a science, can never be considered an exact science.

The casuistry of Parvin applies to the reasoning, the judgment and the philosophy of obstetrics and gynecologic surgery today in its every phase just as it has done from the beginning of civilization.

1100 GRAND AVENUE.

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## THE DETAILS OF POSTPARTUM CARE\*

BY JOHN OSBORN POLAK, M.Sc., M.D., F.A.C.S., BROOKLYN, N. Y.

OVER 60 per cent of the lesions which make up the diseases peculiar to women are the direct results of poor midwifery, the incidence of trauma, infection, and a lack of appreciation of the physiologic and biochemical processes which take place in involution,—yet little or nothing has been collectively written regarding their prevention by better intrapartum and postpartum care. The functions of the obstetrician are:

1. To deliver the woman of a living child with minimum injury to her general system and to her local soft parts.

2. To leave her in such physical condition that she may be an economic asset to her family and to the community, namely, assume charge of her child, nurse it, and attend to her household and social duties. To obtain such a result, presupposes careful antepartum observation, a labor that is properly managed, hemorrhage controlled, injuries repaired, involution completed (which is favored by breast feeding) and, before she is discharged, the correction of uterine displacements. In this short contribution, I shall describe some of the practices employed in our postpartum and follow-up clinic at the Long Island College Hospital; briefly reviewing the physiology of involution, in order that we may lay emphasis upon the effect of subinvolution and the correction and retention of acquired retrodeviations. In support of my contentions I shall give a few figures from the clinic and from my pri-

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\*Read at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, held in Chicago, Ill., September 20-22, 1926.

vate practice, which may perhaps convince some of our unbelievers that in adopting a course of rational routine, detailed though it may seem, more ideal results may be obtained.

While the portion of this symposium assigned to me properly deals with postpartum management and the results, certain obstetric axioms will bear repetition on the basis of cause and effect.

It is a well-known fact too often forgotten that the first stage of labor takes time and pain to secure dilatation of the cervix, and that it is accomplished by a series of physiologic acts so perfectly executed that man cannot improve upon them. These, however, may be favored by the judicious use of anodynes, such as morphine and scopolamine or heroin or, when the head enters the pelvis, by the employment of oil-ether and magnesium sulphate.

Relief of pain, time, sufficient rest, food, and plenty of fluids are the basic principles in the conduct of the first stage. When the presenting part has passed through the cervix into the vagina and internal rotation occurs, too much delay on the distending pelvic floor produces fascial stretching with subsequent relaxation of the anterior and posterior vaginal walls, *even when there is no apparent laceration*. It is only after the head has passed into the vagina, having escaped from the cervix, that the fetus is in danger from interference with the uteroplacental circulation; hence it is at this time that *watching the effect of uterine contraction on the fetal heart is imperative*. The expulsive stage may be shortened by "forceps control," and by the timely use of median or lateral perineotomy *which relieves the pressure on the anterior fascial plates* and thus prevents the occurrence of cystocele and irregular pelvic floor lacerations.

It has been our practice to apply a pair of Hale forceps to the sides of the head as soon as the sagittal suture has rotated into the anterior posterior diameter and the head begins to "crown," these are not used for traction but for control. Then as "crowning" takes place with the pelvic floor on the stretch, a pair of straight Mayo scissors is passed in the median line, between the head and the vaginal mucosa, and the soft parts are divided. *The median incision should be used when the outlet diameters are normal, while an oblique lateral incision is made if the bischial is below 8 cm.* The extent of the incision is entirely governed by the degree of soft part obstruction which is offered.—it usually extends down to the anal sphincter, or in funnel pelvis around to the side of it. This allows easy delivery of the head through an incised wound of the introitus, instead of producing a lacerated bisulcal tear. Experience alone can teach one when and how far to incise, but year after year the logic of this procedure is driven home by the results we obtain in primiparous labors. *Postpartum care begins immediately upon the delivery of the child.* The anesthetic is withdrawn; the perineotomy wound is plugged with a

large pad of sterile gauze to control oozing until the placenta is delivered; the cord is pulled down and clamped close to the vulva, and half an ampoule of pituitary extract is given hypodermically. There is absolutely no manipulation of the uterine fundus, which may be found just to the right and above the umbilicus; and unless uterine expression has been attempted, the placenta will remain attached to



Fig. 1.—Compression of the lower uterine segment against the promontory, shutting off the uterine circulation, while the other hand rubs the fundus into contraction. (Postpartum Hemorrhage from Atony.)

the placental site, and no bleeding can occur until the placenta is separated by the formation of a retroplacental blood clot. When this occurs the classical signs of separation are apparent and not until then is any attempt made at expression, hence, when the fundus rises, the cord descends and blood appears at the vulva, the fundus is grasped with the left hand, the fingers of which are placed behind and the thumb in front, and the uterus which has been acutely anteflexed

to bring it within the grasp of the hand, is laid down in the abdomen to obliterate the uterovaginal angle and at the acme of the contraction the placenta is expressed by Credé. As the placenta escapes from the vulva the right hand is placed just above the pubis, the lower segment is grasped between the thumb and fingers, and the uterine body is raised out of the pelvis while the lower segment is compressed against the sacral promontory. As the uterus is raised out of the pelvis the inverted membranes are detached by the traction made upon them by the weight of the placenta. Cutting off the uterine blood supply by compression of the lower segment against the promontory favors contraction and retraction of the fundus. By following this technique in detail our average blood loss in the past two years has been less than 200 c.c. which figure includes two postpartum hemorrhages of 1600

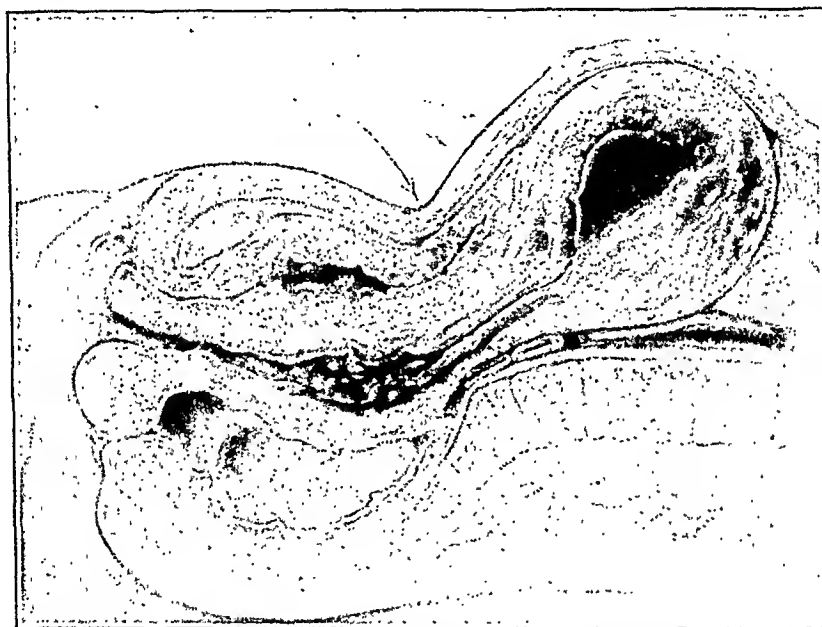


FIG. 2.—Sagittal section showing compression of the lower uterine segment against the promontory and the iliac vessels.

c.c. each. This maneuver was first suggested by R. L. Dickinson in 1908.

Bleeding of any considerable amount occurring immediately after the delivery of the child, with the fundus firm, indicates cervical injury and should demand inspection of the cervix after the placenta has been expelled.

Primary suture of the torn cervix with proper technique is relatively easy and these immediate repairs heal with great nicety and obviate later trouble. Routine cervical suture, however, cannot be generally indorsed for it is distinctly a hospital procedure and requires surgical training and a perfect aseptic technique.

When the uterus is firmly contracted and all uterine bleeding has ceased a sterile vaginal tampon is placed against the cervix and the

pelvic floor injury is exposed by lateral traction with a Gelpi or Friedlaender retractor and an anterior trowel so as to illuminate the limits of the tear. A traction suture is then placed parallel to the long axis of the vagina, entering at the lateral limit of the tear, passing deeply under the vaginal mucosa so as to include the levators of one side to the apex of the wound and down through similar tissues on the opposite side emerging at a corresponding point to the point of entrance. Traction on this suture brings the levators forward and

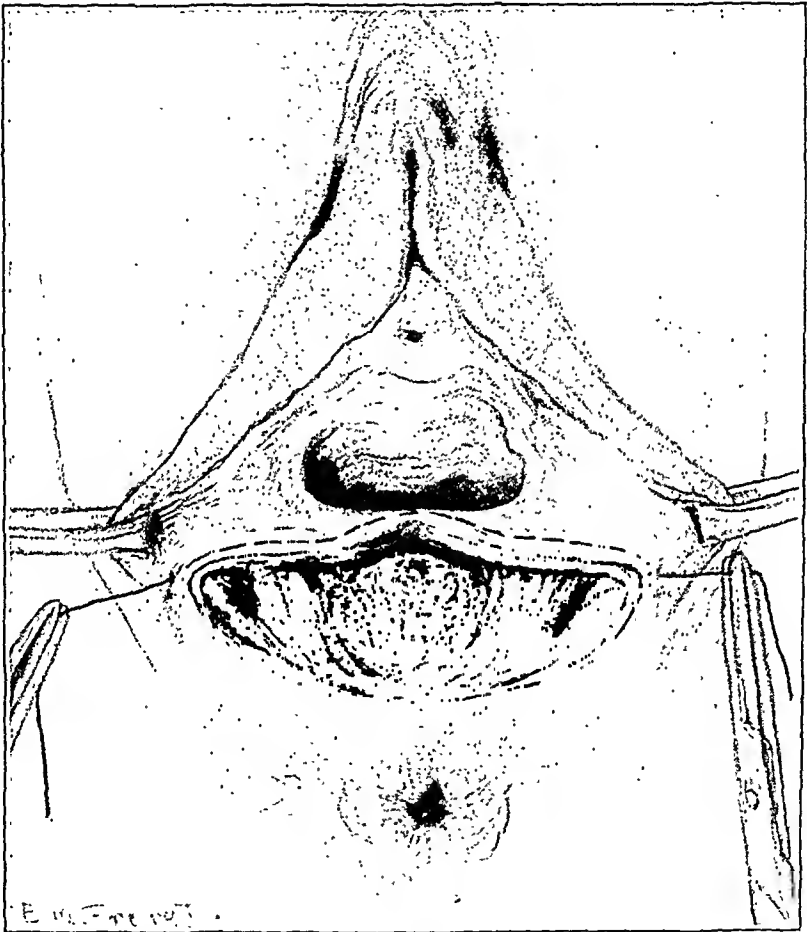


Fig. 3.—Preliminary traction suture passed behind the levators and above the apex of the perineotomy wound—traction on the ends brings all of the tissues forward and facilitates suturing.

makes repair of the uppermost angle easy; for the uniting sutures can then be passed from above downward bringing like tissues together, fascia to fascia, muscle to muscle, and mucosa to mucosa. This repair may be done with interrupted sutures of iodized gut (which we use) or with a buried continuous suture. There is some advantage in having the traction suture of silkworm-gut, for, when tied, it acts as a splint. *No pads are used for we believe that the wound is sealed in a few hours and that pads are likely to carry rather than prevent infection.*

When all bleeding has ceased, before leaving the woman, it is our practice to grasp the fundus and expel the first clot, for the second clot will be smaller and retraction better. At this time ergot or some of its derivatives is given. After the patient has been returned to bed a course of ergot is given in half-dram doses, every three hours during the first day,—this is supplemented by placing *an ice bag on the abdomen over the fundus*, which further stimulates the uterus to contract and retract. Immediately after the woman reacts from her anesthetic the head of the bed is elevated some eighteen inches and she is placed in the Fowler position; the bed remains elevated for the first forty-eight hours unless a severe blood loss has been sustained. Postural drainage and a well retracted uterus offer the greatest barrier to infection, for with the sinuses sealed with firm thrombi, migration of the vaginal flora is but a harmless excursion. Involution is the physiologic process by which the hypertrophied structures taking part in the development, growth, and nutrition of the ovum return to their normal size, tone, and function. The term involution should not be applied alone to the uterus for it includes all of the tissues of the pelvic soft parts; it is, however, with the uterus that practically all of the studies relative to involution have been made. It takes from ten to twelve weeks to complete this process and any interference with the normal changes leaves a permanent pathology which arrests the perfection of the physiologic process.

The uterus as a whole at the close of labor is said to weigh from 800 to 1000 grams; it measures from 15 to 20 cm. in length, and from 11 to 12 cm. in breadth at the level of the fallopian tubes. The wall of the upper uterine segment is from 3 to 4 cm. in thickness while the sound measurement of the uterine cavity is from 14 to 16 cm. When one compares these figures with his impression of the normal uterus on bimanual examination or the sound measurements of the nulliparous organ with a cavity depth of only 6 to 7 cm. he must begin to appreciate the necessary physiologic changes which take place in the course of involution to accomplish this great reduction in size, especially when the uterus has reached the stage of hyperinvolution.

During pregnancy the muscle cells are greatly hypertrophied being 10 or 12 times the normal length and 3 or 4 times their normal breadth. It is therefore apparent that after labor we have an enormous amount of tissue which must disappear, as evidenced by the fact that in the first two weeks the uterus loses something over a pound in weight. This takes place as the result, (1) of increased oxidation, and (2) continued contraction and retraction producing a relative anemia of the organ, for, as the uterus contracts and retracts, shutting off its blood supply, the muscle fibers undergo a rapid fatty degeneration while the fibrous tissues degenerate through hyaline changes and are partially absorbed.

The large cells degenerate only to a certain point, and atrophy usually ceases as soon as the cells reach their original size.

The primary changes, however, will be seen to be in the blood vessels for, according to Goodall, the uterus renews all of its arteries after each pregnancy. The old vessels become more tortuous, many may become obliterated by thrombi, while others have thrombi formed within them, thereby diminishing their lumen, and their coats undergo hyaline changes. This sudden reduction of the blood supply causes the muscle fibers to undergo fatty changes which allow of more or less absorption. The cervix undergoes involution in a manner similar to that of the body so that the whole organ is diminished in size but retains a more or less normal relation of muscle and elastic tissue, except in the later years of sexual life and under the influence of disease when highly specialized tissues have a tendency to be replaced by less specialized tissues, namely, muscle by elastic tissue,—which explains the fibrous uterus found at the menopause and in the multipara. The mucosa also participates in these changes; the inner layer which is in contact with the decidua is thrown off by a process of starvation necrosis, while the basal decidua, which contains the glandular structures, regenerates a new mucosa from epithelial islands; the placental site is the last to receive its protective coating of epithelium. The ovaries also diminish in size, the corpus luteum cyst of the pregnancy usually makes one adnexum larger and more palpable than the other. Similar changes to those in the vessels of the uterus take place in the walls of the vessels about the atrophic corpus luteum. The ligaments and parametrial tissues likewise gradually regain their tone and also the adjacent bladder and rectum.

Having briefly called attention to the changes which normally take place when there is complete involution of the pelvic structures, it will not be amiss to mention that infection, lacerations, with resulting relaxation of the pelvic tissues, which permit any considerable descent of the uterus, retrodisplacement, visceroptosis or full rectum all disturb the circulatory equilibrium within the pelvis and allow passive congestion to occur. These lesions retard the physiologic processes and leave a permanent pathology which is recognizable years later and produce a symptom complex known as the gynecologic triad; i.e., hemorrhage, leucorrhea, and pain. We attempt and in great part succeed in combating the occurrence of these conditions by: (1) the avoidance of infection, (2) by minimizing the trauma of labor, (3) by limiting the blood loss, (4) by the immediate repair of birth injuries, (5) by maintaining retraction and contraction of the uterus by encouraging breast feeding and thus favoring the physiologic acts included in involution, (6) by favoring uterine and vaginal drainage by the employment of posture, (7) by reestablishing the intraabdominal pressure and the muscular tone of the abdominal wall by having the woman practice

suitable active exercises, (8) by intermittently emptying the venous pelvic engorgement by having the patient assume the knee-chest position several times a day, (9) by recognizing and treating the co-existing erosions of the cervical mucosa at a time when extension of the infection may be prevented, (10) by the correction of all malpositions and displacements of the uterus with the associated engorgement of the pampiniform plexus by posture, manipulation, and the retention of the repositioned uterus with a properly fitted pessary, and (11) in checking up on these conditions by periodic postpartal examinations until the involution is complete and the anatomic relations perfect.

It is needless for me to call attention to the means of minimizing the trauma of labor, except to restate the principle that the cervix must be fully dilated by the physiologic processes; i.e., labor pains and the hydrostatic action of the bag of waters; and the head must have passed through the cervix or the cervix be so dilatable that the head can pass through it before artificial aid by forceps or version can be considered. Furthermore, we believe that the employment of a properly timed perineotomy in selected cases will preserve the fascial and muscle structures better than the older methods of time, stretching and laceration. Likewise blood loss must be controlled in the third stage of labor, for the anemic woman has less individual resistance to infection and toxemia and in recuperation than the robust normal individual. The anemic woman stands surgery and anesthesia badly, hence in case of excessive blood loss, it is well to allow the woman to react from her shock and have the volume of blood increased by transfusion or infusion before any surgery is undertaken. When injuries do occur immediate surgical repair (patient's condition permitting) should be the rule; this means muscular and fascial reconstruction not mucous membrane and skin suture. At the Long Island College Hospital we make of this repair a surgical procedure, often postponing the operation until the next morning if the labor has been tedious, operative with long anesthesia, and much blood loss.

Contraction and retraction of the uterine muscles must be maintained by ergot and the fundal ice bag in order that thrombi may organize within the vessels. It is the retraction that controls bleeding while the contraction favors uterine drainage. By placing the patient in the Fowler position and encouraging her to turn upon her abdomen three or four times in twenty-four hours the vagina is kept free of lochia, the downward drainage prevents the multiplication and upward migration of the bacteria of the vaginal flora. By lying on the abdomen the woman empties the vagina of all retained discharge and hence the cervix no longer rests in a pool of bacteria.



During pregnancy the enlarging uterus gradually distends the abdomen and separates the recti muscles. When at the close of labor the uterus is suddenly emptied of its contents the intraabdominal pressure is lowered and the intestines and bladder lose their muscular tone and are therefore subject to distension. It was formerly the practice to control this distension by employing a tight abdominal binder, under the false impression that this artificial support would

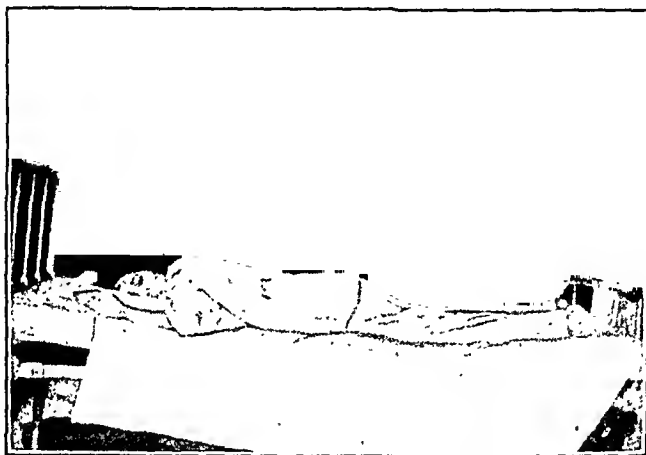


Fig. 4.—Postural drainage. Patient on her abdomen in the Fowler position.

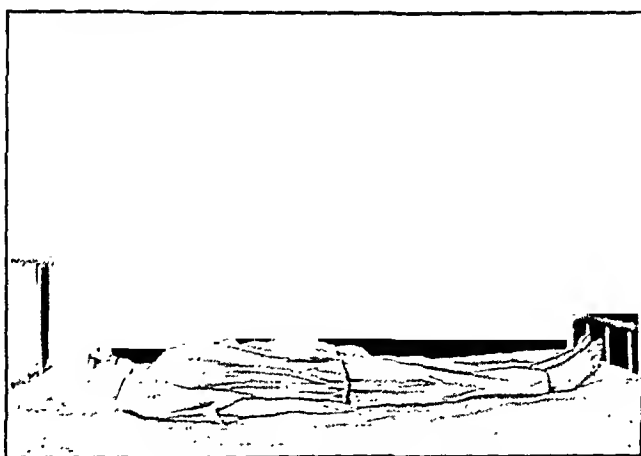


Fig. 5.—Breathing exercise.\*

remedy the muscular weakness. We now know that the muscular tone of the abdominal muscles may be restored by suitable active exercises which the woman can do several times a day while lying in bed, and so replace the muscular support that nature intended the abdomen to have. These exercises may be begun after the first forty-eight hours of the puerperium.

When we consider the immense increase in the pelvic circulation necessary for the development of pregnancy, we can readily appreciate

\*Figs. 5 to 13 show exercises used during the first ten days of the puerperal period in the maternity service, Long Island College Hospital.

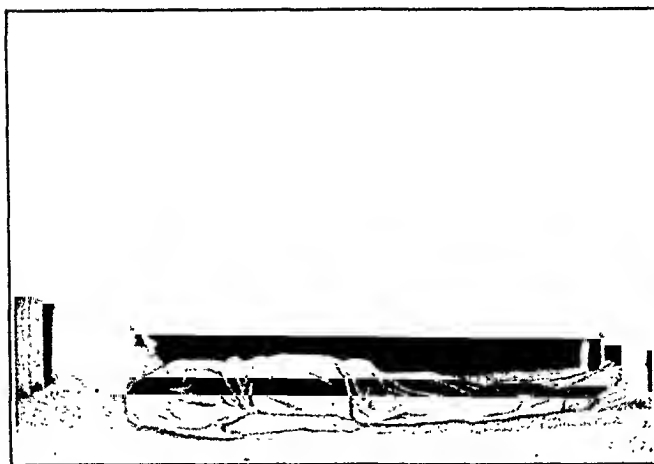


Fig. 6.—First exercise used for improving tone of the abdominal muscles.

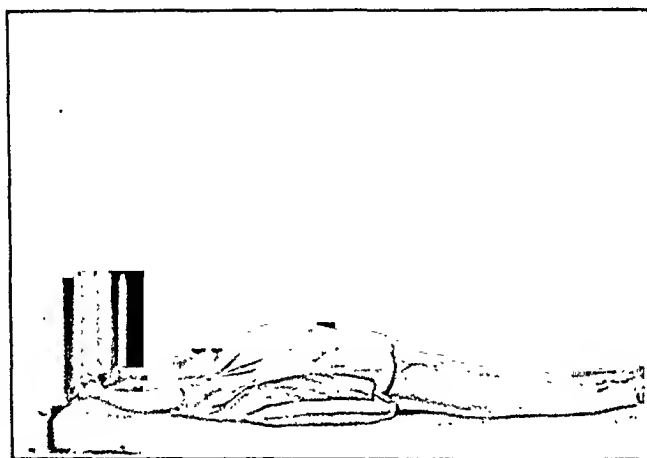


Fig. 7.—By elevating the diaphragm the abdominal content is raised and circulation improved.

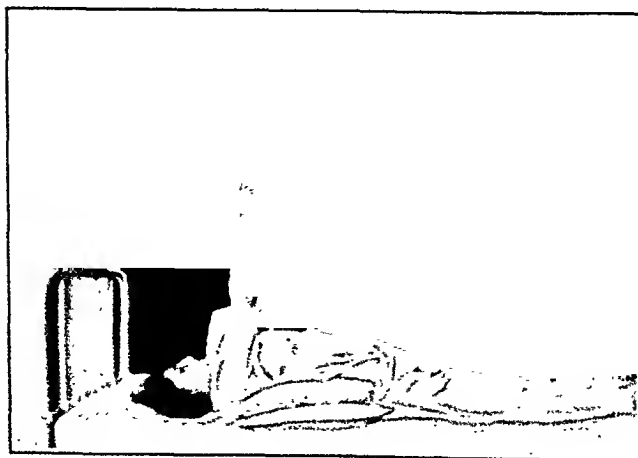


Fig. 8.—Deep breathing exercises.

that the sudden emptying of the uterus with its firm retraction, compression, and vessel torsion will so engorge the pelvic veins that edema and tissue swelling must take place, unless the engorged veins are emptied by gravity as when the knee-chest position is assumed for ten minutes three or four times a day. This position serves the double purpose of emptying the engorged veins and massaging the pelvic ligaments and may be begun as soon as the lochia alba appear. With

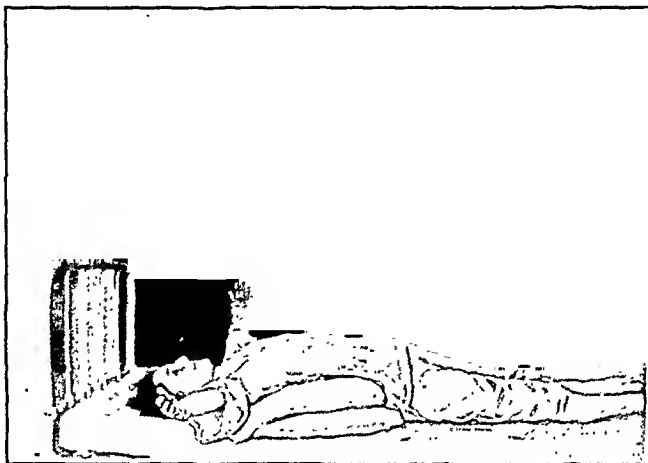


Fig. 9.—Deep breathing exercises.

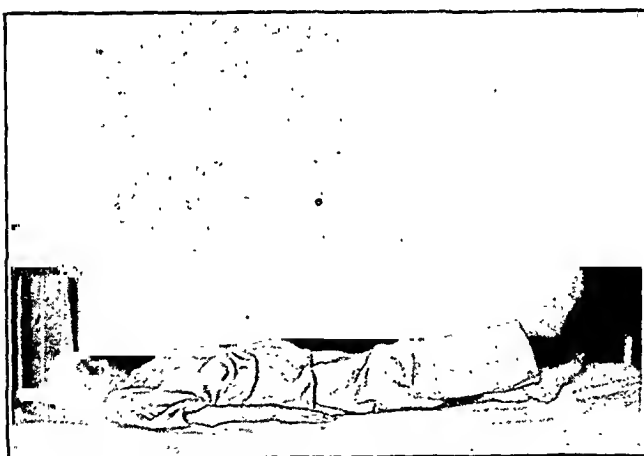


Fig. 10.—Leg exercises for developing the abdominal muscles.

lochia rubra we cannot be sure that the sinuses are completely closed, hence there is possible danger of embolus or of an extending thrombosis by too early muscular activity. Not infrequently the use of the knee-chest position will start up a red lochia; this is an index that retraction is retarded and that exercises should be discontinued until the bloody discharge ceases. Just about this time; i.e., the fourth or fifth day, when all fragments of placental tissue have been separated and expelled, the mammary secretion begins and may become excessive, with marked breast engorgement and physical discom-

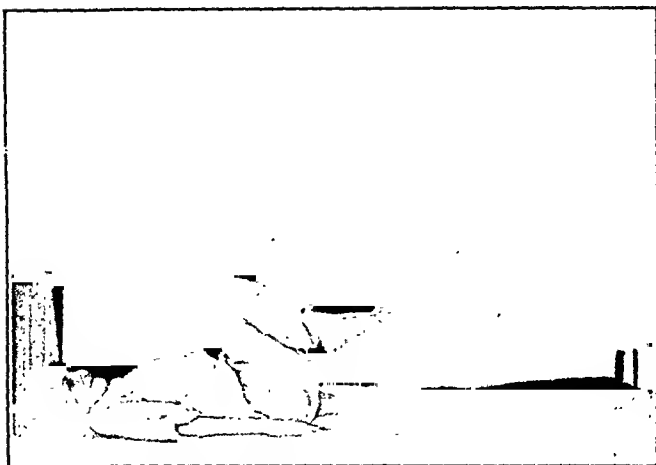


Fig. 11.—Leg exercises—developing the tone of the abdominal muscles.

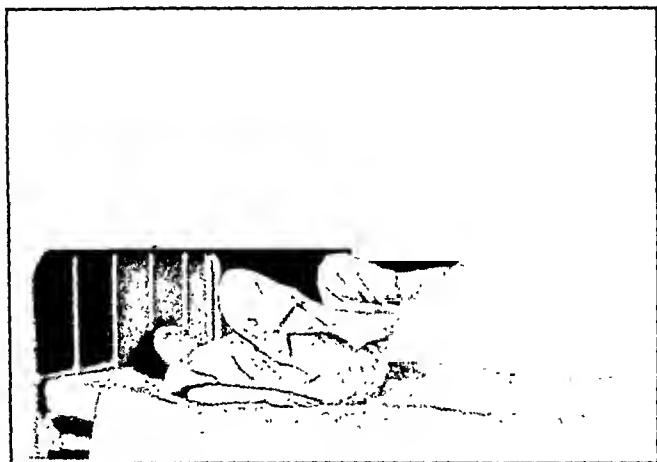


Fig. 12.—Abducting the thighs to tone up the thigh muscles.

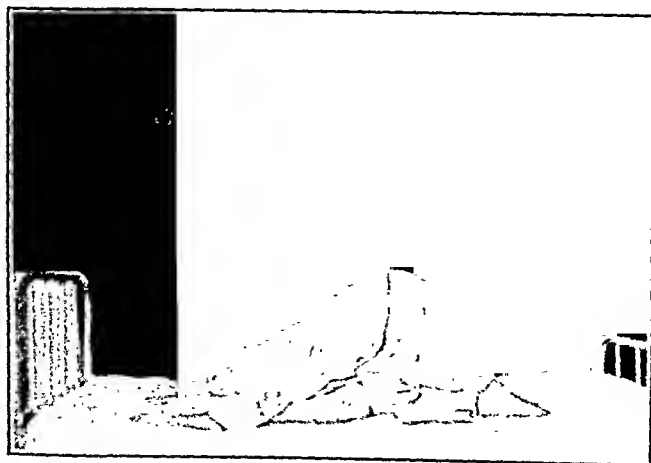


Fig. 13.—Knee-chest position favors emptying the pelvic veins and massages the ligaments.

fort. A single dose of  $\frac{1}{4}$  grain of morphine with breast support will usually control the excess secretion and give comfort; however, if the breasts are large, hard, painful, and pendulous with indurated areas in the outer lower segments, strapping with zinc oxide plaster strips, so placed that they both support and compress the gland, will give almost instant relief, for when properly applied the flow of milk from the nipples is immediately established without trauma to the lactiferous tubules. Mammary strapping, also, has a valuable place in controlling incipient breast infection; as for example, a puerpera of about the eighth or tenth day who has suffered from fissured nipples, has been using a shield, and has had the usual palliative treatment, is suddenly seized with a chilliness, a rise in temperature, localized pain, and an area of induration in the breast. Under such conditions it is our custom to discontinue breast feeding and give  $\frac{1}{4}$  grain of morphine to control the milk secretion, to quiet the pain, and to promote the well-being of the woman. The breast is then snugly

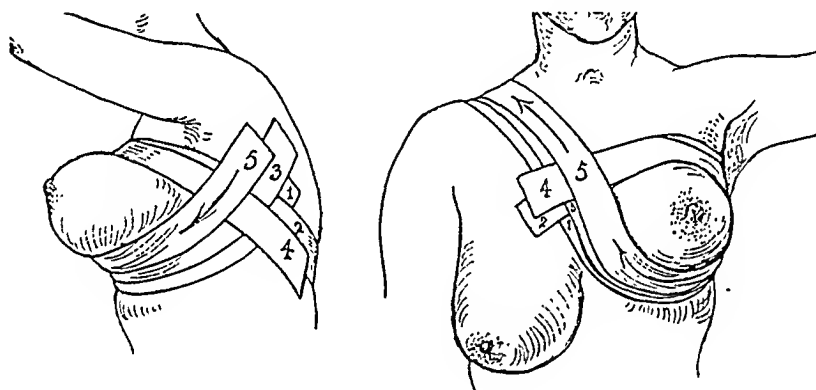


Fig. 14.—Breast strapping for the control of engorgement and as a prophylactic in incipient infection.

strapped in such a way as to produce peripheral circulatory compression as well as to give breast support; in many cases the pain and induration subside and abscess formation is averted.

The cervix after labor is always the seat of a granular endocervicitis, which produces an irritating discharge and is liable to become a mixed infection from the upward spread of the vaginal flora. The application of the electric cauterizing knife by crucial incision or circular searing to this everted erosion speedily cures the discharge and causes an inversion of the cervical mucosa.

For a number of years it has been our custom to make the final examination of each patient about two days prior to her discharge from the hospital, usually on the fifteenth or eighteenth day of the puerperium. At this time the uterus is commonly found to be well involuted, ante-flexed or anteverted, and slightly lower in the pelvis than normal; the vaginal mucous membranes are turgid and the parametria are tender. The patient is then directed to take a "postpartum pill" three times

a day, keep her bowels regular with water, fruit, cereals, and mineral oil, avoid overdistension of the bladder, support the breasts with a well-fitting brassiere, and to wash the nipples before and after nursing with a boroglyceride solution. She is then taught the "monkey trot" and the "mule kick" and is instructed to do these exercises for five or six minutes night and morning. These exercises empty the pelvic veins, massage the ligaments, and help to maintain the uterus in an anterior position.

As a result of the foregoing plan of puerperal care over 90 per cent of our women were discharged from the hospital with the uterus in normal position, but when these same patients returned to the clinic for their follow-up examination three to six weeks later, 38 per cent had the uterus retroverted or retroflexed. About eight years ago we started the practice of teaching the "monkey trot" and the "mule kick" to our

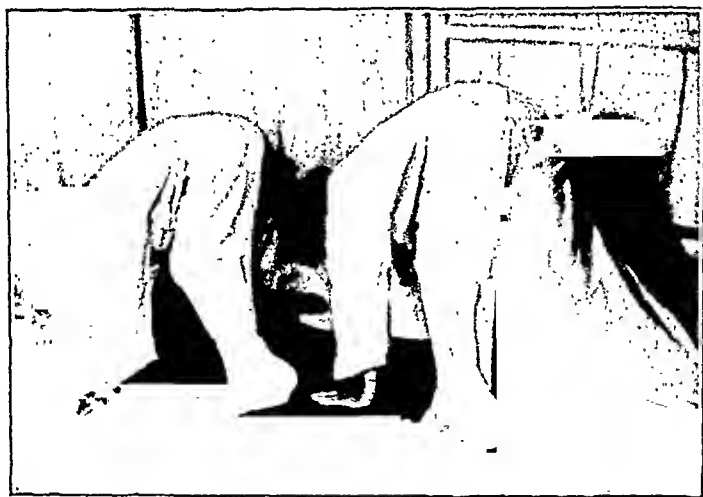


Fig. 15.—The monkey trot.

postpartum clinic and private patients, instructing them to employ these exercises night and morning during the time between their examinations. The adoption of this plan was rewarded by an incidence of only 3 per cent of retroversion, and of these, 2 per cent could be manually repositioned and retained by a pessary.

Uterine bleeding after the patients were discharged from the hospital was another annoying symptom which was almost always found to be coincident with subinvolution or displacement; ergot and exercises controlled it when due to subinvolution, while the pessary cured the hemorrhage due to retrodisplacement.

In this day of surgery the pessary is a much neglected aid, yet I feel sure that the large majority of acquired retroversions, provided the patient has intact structures, if treated before they become flexions, can be relieved and many times permanently cured with the pessary.

In closing, permit me to say that too much stress cannot be laid upon the importance of follow-up examinations throughout the postpartum

period and of the correction of malpositions before actual pathologic changes have taken place within the uterine walls, parametria, and the adnexal tissues, and furthermore, that the future health of our women depends largely upon the recognition and employment of the advances that have been made in prenatal study, interpartum asepsis, rational midwifery, and upon weeks of intelligent postpartum care. The traditional ten-day period of care after delivery, the curse of the past, is fortunately relegated to history.

20 LIVINGSTON STREET.

## THE OBSTETRIC FUTURE OF WOMEN DELIVERED BY THE LOW OR CERVICAL CESAREAN SECTION\*

BY LOUIS E. PHANEUF, M.D., F.A.C.S., BOSTON, MASS.

THE first attempt to place the incision in the cervix in performing cesarean section dates back to 1805 and the credit belongs to Oslander of Goettingen. Obstetricians in general were reluctant to adopt the method and the operation has been brought to its present state of perfection largely through the efforts of a limited group of operators. The low cesarean did not find favor in America until comparatively recently. Barton Cooke Hirst of Philadelphia had advocated his transperitoneal operation for neglected cases in 1908, but as late as 1919 he was still advising the classical operation for routine cases. The same year, 1919, DeLee reported forty cases of cervical cesarean at the seventieth annual session of the American Medical Association. So impressed was he with his results, that he felt that this method would, in the course of time, replace the old classic operation. Since the publication of his monograph, papers by Beck, Cornell, DeLee, Hirst and VanDolsen, Hodgkins, Polak, Polak and Beck, Phaneuf and Quigley have appeared in the American literature. These men were well agreed upon the fact that the advantages offered by this newer procedure greatly overbalanced the slightly increased technical difficulties necessary in its performance.

No one who is interested in this subject should fail to read DeLee's illustrated history of the low or cervical cesarean section which appeared in the October, 1925, issue of the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY.

The claims which have been made for the cervical operation are:

1. The cervix is that part of the uterus which stands infection the best, a fact repeatedly observed in gynecologic practice; the pelvis is also more resistant to infection than the upper abdomen.

\*Read at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, held in Chicago, Ill., September 20-22, 1926.

2. The wound is placed in the noncontractile part of the uterus and heals undisturbed, therefore lessening the possibility of rupture in subsequent pregnancies and labors.

3. Adhesions are less frequently encountered since the incision in the uterus is completely covered with peritoneum, and if adhesions occur they are so situated in the pelvis that they are less likely to give rise to serious trouble than if they were found in the upper abdominal cavity.

4. A real test of labor may be given with safety, a point greatly emphasized by all who have had experience with this method, the result of this being that a number of parturients who with the absence of this test might have been delivered abdominally, are delivered through the pelvis.

5. Hernia in the abdominal incision is less frequent since it is a known fact that herniae in suprapubic median incisions are less common than in incisions situated in the upper abdomen.

6. The convalescence approaches more nearly that of a pelvic delivery; it certainly is not the ordeal of the old classical operation.

7. The morbidity and mortality are greatly reduced.

8. Lastly, it permits the delivery of a living child through the abdomen when certain conditions exist which would make the classical operation a hazardous procedure to undertake.

While all these deductions were logical the statistics on repeated operations were too few to prove some of the points claimed, especially the better healing of the cervical incision and the decreased frequency of adhesions. Gaifami, in 1923, reported that in his twelve patients that came to a secondary operation no signs of weakening were found in any of the scars. The writer in his last publication on the subject had reported a like result, namely, no weak points in any of the scars of his thirteen patients who had come to a secondary operation. Hamm in discussing Fleurent's paper stated that he had repeated the low cesarean twice without difficulty but he does not mention the condition of the previous scars. Fleurent reported one pelvic delivery in his series of ten cervical sections.

In discussing a report entitled "Les pelvitomies" by Rossier et Le Lurier, given before the fourth congress of the Association of French Speaking Gynecologists and Obstetricians, held in Paris, October, 1925, Haugh of Copenhagen, who favors the low cesarean rather than pelviotomy, reported two cases of low cervical cesarean section where he was unable to find the previous cervical scar at the secondary operation. He further stated that he saw a similar case in the clinic of Van Rooy at Amsterdam where it was impossible to demonstrate the first scar.

Wetterwald states that 45 per cent of 100 women became pregnant after a low cervical cesarean section. In thirteen cases the operation was repeated; the old scar in the cervix was almost invisible. In forty deliveries, childbirth occurred by the natural route. There was rupture of the scar in one of a total of forty-five women. In 62 per cent of the cases delivery was spontaneous, while spontaneous de-



livery after symphyseotomy has been recorded in about 59 per cent, and after pubiotomy, in 22.7 per cent. After high cesarean section, rupture in successive pelvic deliveries occurred in 25 per cent; after cervical section, in 3 per cent. Low cesarean section is also recommended for placenta previa; ten deliveries occurred by the vagina in eight women that had been previously treated in this way. The literature records ten ruptures in the cicatrix in 3,600 cesarean sections by this technic (0.28 per cent).

My series of cervical cesarean sections consists of 206 operations, 150 by the Sellheim method and 56 by the Veit-Fromme-Hirst. Most of these were published in detail in previous articles and it is with the repeated operations only that I wish to deal in this paper.

In order to understand what conditions may be found at a subsequent operation it is necessary to understand the technic of the various cervical operations.

There are three methods of approaching the cervix in performing cesarean section:

1. *The Modified Sellheim Method.*—This in common use is based on the fourth operation of Sellheim which was modified in small details by Franz, Opitz, Kroenig, Polak, Beck, DeLee and myself. This is the procedure referred to as laparotrachelotomy by DeLee. My personal series includes 150 operations of this type.

This is an intraperitoneal, retrovesical operation, performed through a median, suprapubic longitudinal incision. After opening the abdominal cavity the uterovesical plica is incised transversely; the bladder is separated from the cervix as in doing a hysterectomy; a longitudinal cervical incision is made within the denuded space; the fetus, placenta and membranes are extracted; the cervical incision is closed, and the bladder peritoneum is sutured to the uterus in such a way that the cervical incision is completely covered. The only line of suture thus exposed to the peritoneal cavity is that of a continuous suture of fine catgut which attaches the bladder peritoneum to the uterus and sinks under the bladder as this organ fills. Opitz, Beck and DeLee have modified this operation by raising an upper as well as a lower flap of peritoneum. In their closure they suture the upper peritoneal flap to the lower segment by interrupted sutures thus covering the upper part of the cervical incision, and complete the operation by suturing the lower flap by a continuous suture, in such a way that it overlaps the upper flap. Their claim for this procedure is that it offers more definite protection to the peritoneal cavity should infection occur in the uterus. I close by uniting the peritoneal flaps with a fine continuous catgut suture and do not in any way anchor them to the uterus. My experience has been that this procedure makes the bladder separation at a subsequent section less difficult than if the peritoneum is firmly attached to the uterus.

2. *The Method of Veit-Fromme-Hirst.*—The author has delivered 56 women by this method which was referred to as the transperitoneal operation, and was advised by Veit and Fromme of Halle in 1908. The same year Hirst of Philadelphia independently worked out a similar operation. This is performed through a longitudinal pelvic incision; the vesicouterine peritoneum is incised longitudinally, the bladder is separated from the cervix and two lateral flaps of visceral peritoneum are dissected. These are united to the parietal peritoneum thus creating a so-called extraperitoneal space, through which a longitudinal cervical incision is made and delivery effected. The peritoneal flaps are at first united by carefully applied interrupted catgut su-

tures. Sutures are used instead of clamps as, in my experience, they are less likely to tear the peritoneum and after the closure of the cervical incision they are further approximated by a continuous catgut suture. The peritoneal edges are firmly united in the course of a few hours and thus the cervical incision is entirely extraperitoneal during the convalescence. This method also protects the abdominal cavity from the spill during delivery.

3. *The Method of Latzko, which represents the type of the true extraperitoneal operation.*—Through a median longitudinal pelvic incision the unopened peritoneal sac is lifted off the anterior portion of the inlet, the bladder, and the lower uterine segment. The cervix is thus cleared, a longitudinal incision is made and delivery is accomplished.

I performed my first low cervical operation in December, 1919, and since then have entirely substituted it for the classical operation in my service.

The modified intraperitoneal, retrovesical, Sellheim operation is employed as routine in clean cases, while the Veit-Fromme-Hirst transperitoneal method is resorted to in the presumably infected ones, that is, in these women who have had long labors, ruptured membranes and vaginal examinations, but who are still in fairly good physical condition and have no fever.

Since in the series of cases to be reported the two forms of cervical sections employed were the modified Sellheim and the Veit-Fromme-Hirst, the secondary or repeated operations followed either one of these methods.

Under ideal conditions following the Sellheim procedure, no trace of a previous cesarean section should be found upon opening the abdomen at a subsequent pregnancy. Following the Veit-Fromme-Hirst transperitoneal operation one finds a band of peritoneum, varying in width, extending from the parietal peritoneum to the lower uterine segment. This band is easily resected from the abdominal wall and a Sellheim section can always be performed. The woman who has had a previous Veit-Fromme-Hirst operation is advised to report for delivery before labor sets in so that she is not exposed to the conditions which made that method of delivery necessary with her first labor, and the extra protection offered by this procedure is not essential at her subsequent delivery. In the series of repeated operations reported, therefore, all the cervical sections were of the Sellheim type.

#### ANALYSIS OF CASES OF REPEATED CERVICAL CESAREAN SECTION

There were 71 cervical operations performed on 30 gravidæ; of these 41 were repeated sections in the lower uterine segment. Three women had four, five women had three and twenty-two women had two operations. In the original 30 first operations 14 were done according

to the Veit-Fromme-Hirst method and 16 according to the Sellheim technic. There were no incisional herniae in any of these cases; the abdominal sear of the previous operation was resected at each subsequent delivery. All of the repeated operations were of the Sellheim type except one.

Upon opening the abdomen after the fourteen Veit-Fromme-Hirst operations a peritoneal band varying in width from the size of a string to about two inches, and extending from the cervix to the

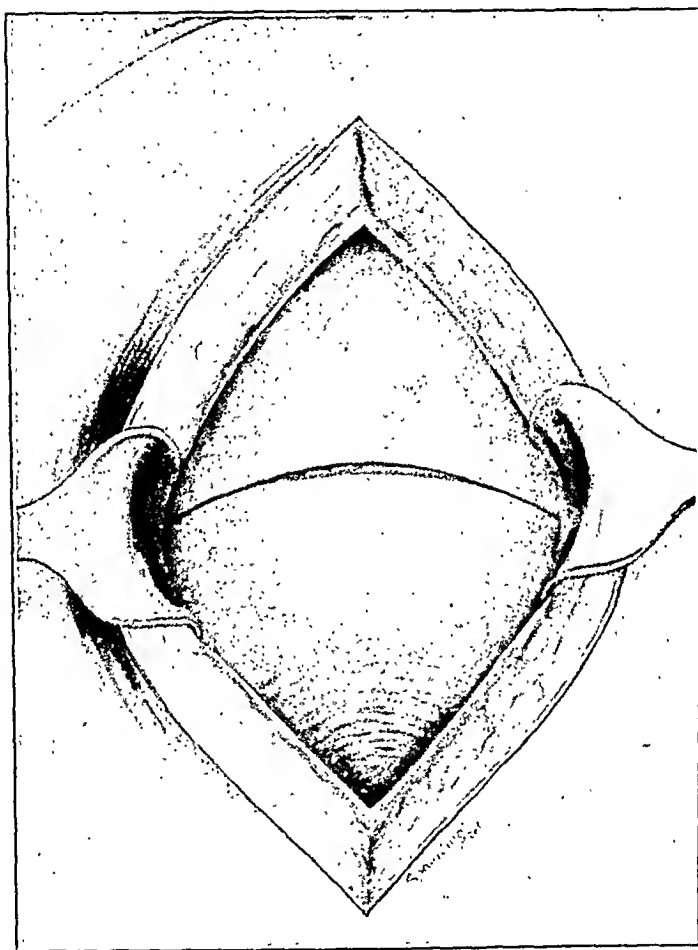


Fig. 1.—Low or cervical cesarean section. Median suprasymphyseal incision exposing the lower uterine segment. The visceral peritoneum is incised transversely where it is loosely attached slightly above the bladder reflection.

abdominal wall was found. This band was resected from the parietal peritoneum before separating the bladder in doing the repeated operation. In the twenty-seven repeated Sellheim sections pelvic adhesions were encountered in seven cases. Four women had one thin band of peritoneal adhesions, one had two narrow bands, and another three fine bands. All these led from the cervix to the anterior abdominal wall. One patient at the third operation showed omental adhesions to the parietal peritoneum. In the twenty other repeated

sections, some of which were fourth operations, the pelvis was absolutely free of adhesions. No difficulty was encountered in separating the bladder a second, third or fourth time. In two women who had had a previous Veit-Fromme-Hirst operation, and in another who had had three previous Sellheim operations, a very small opening was made in the bladder while making the abdominal incision. This was repaired with fine catgut and gave no further trouble.

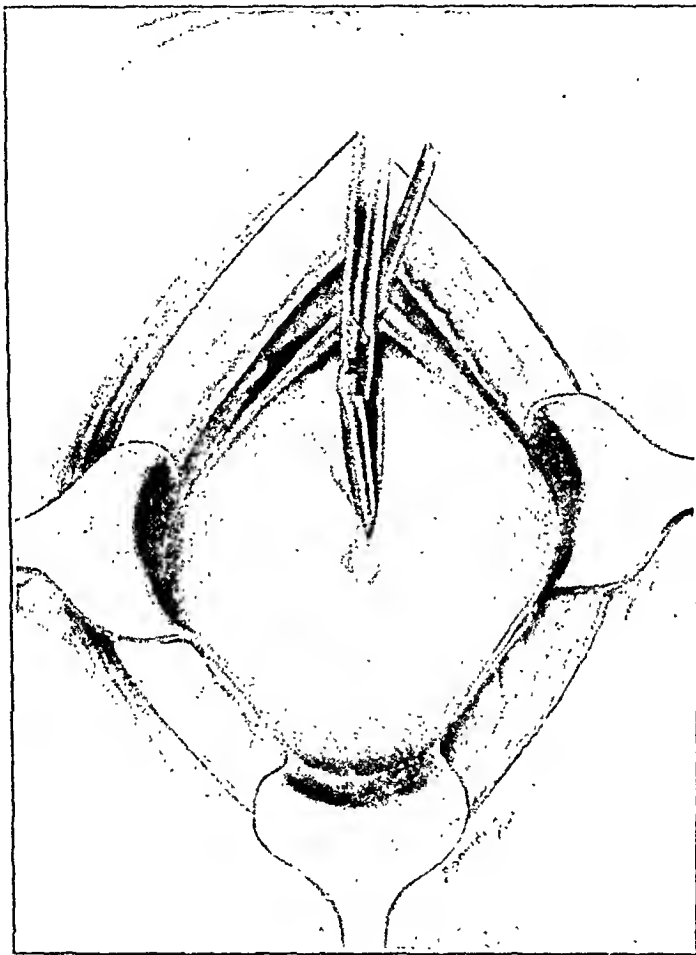


Fig. 2.—Low or cervical cesarean section. A lower flap of peritoneum is separated with the bladder which is held under the symphysis by a retractor. An upper flap of peritoneum is raised and is held by Allis forceps. The lower segment is incised with bandage scissors to protect the child's head.

*The most impressive point in this study was that in these forty-one repeated low cesarean sections, upon the separation of the bladder, the lower segment was found to be smooth, there were no depressions and the previous scars, as such, could not be identified. This observation has been confirmed by Gaifami, Haugh, Van Rooy and Wetterwald. In view of these findings, in spite of the fact that the series is small, it seems logical to accept the statement that a cervical scar is a safe one. I have never failed to find the scar of a previous classic operation which came under my observation.*

One case deserves special mention. On December 8, 1920, this young woman had a Veit-Fromme-Hirst cesarean section for eclampsia. She had had a number of antepartum and thirty-six postpartum convulsions. She had also been examined vaginally by the attending physicians before operation. She made a satisfactory recovery. On November 8, 1922, she had a low cervical cesarean section, the usual band of adhesions extending from the cervix to the anterior abdominal

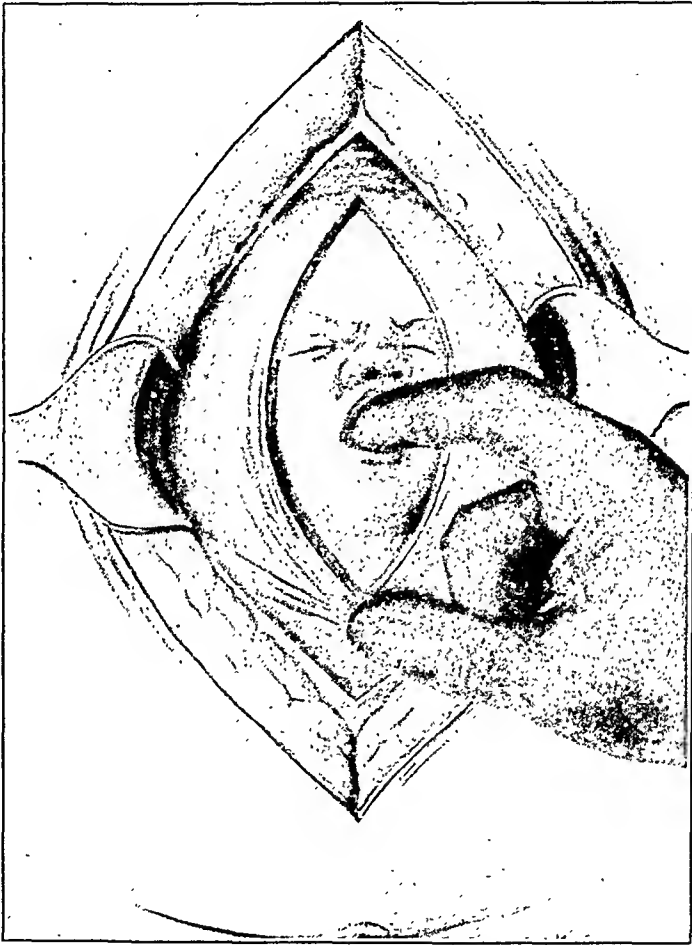


Fig. 3.—Low or cervical cesarean section. With the index finger in the child's mouth, the face is turned to the incision. The left hand is introduced under the vertex and pressure is made on the fundus, the head is thus easily delivered. Forceps are practically never used.

wall was resected; the previous cervical scar could not be identified. On March 20, 1924, she had another low cervical section. At this time there were no pelvic adhesions and the two previous scars in the lower segment were not seen. On August 4, 1926, she had her fourth hysterotomy. As the abdominal scar was resected it was found that the lower segment was firmly adherent to the abdominal wall so that the uterine incision was made without in any way entering the peritoneal cavity. Her last convalescence was ideal.

In this series of 71 hysterotomies one woman died at her third operation. She had valvular heart disease and had been kept in bed, part of the time in a hospital, for the large part of her pregnancy. I saw her the day before delivery and she was operated upon April 17, 1926. The day after operation her temperature was normal and her pulse was 100. There were no signs of infection and she died on April 21, 1926, as a result of her cardiac condition. All the gravaide who had repeated cervical sections had very satisfactory recoveries

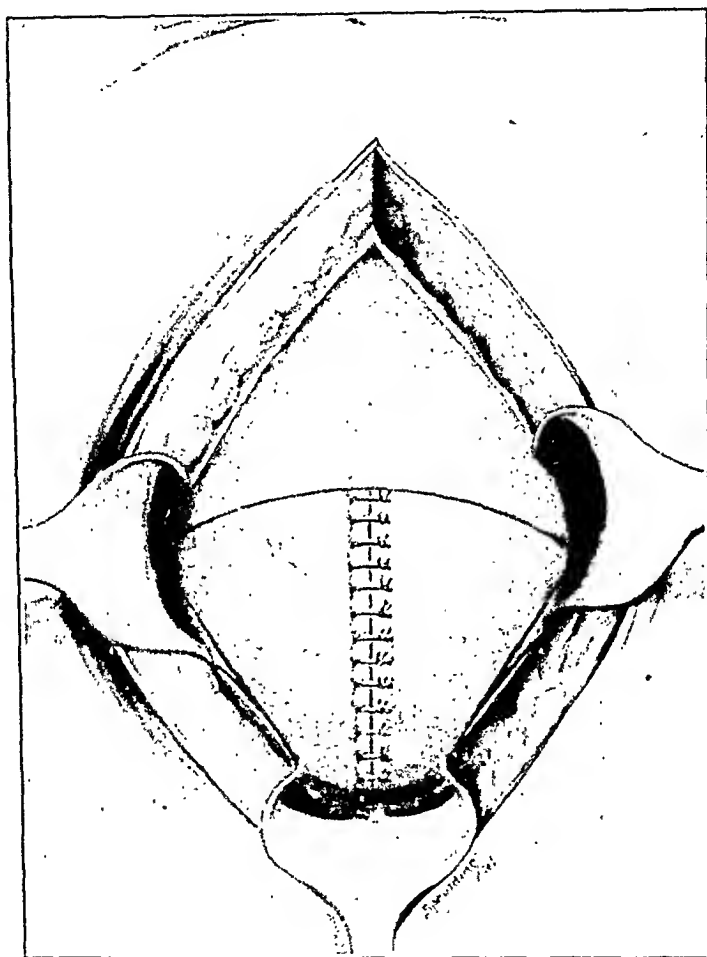


FIG. 4.—Low or cervical cesarean section. The cervical incision is sutured in one layer, with interrupted sutures of No. 2 chromic catgut. The upper flap of peritoneum is brought down but not anchored in any way to the uterus.

which were free from complications. This was due partly to the type of operation used and partly because they were done at the time of election or at the onset of labor, and had intact membranes, and no vaginal examinations. Gaseous distention was not a troublesome factor in any of the cases.

In this series of 41 repeated operations 42 babies were delivered. One patient had heterologous twins. Two of the infants were macerated at birth, one was a second, and the other a third child. All those who were born alive survived.

### DELIVERIES THROUGH THE PELVIS FOLLOWING THE CERVICAL CESAREAN SECTION

Four women were delivered through the pelvis following the cervical cesarean section. The first had had a hysterotomy for a complete placenta previa and she subsequently had three normal deliveries, the last one taking place on August 18, 1926. Her baby weighed 9 pounds, 5 ounces. The second had been delivered abdominally for ablatio placentae; two years later she had a normal delivery of a child weigh-

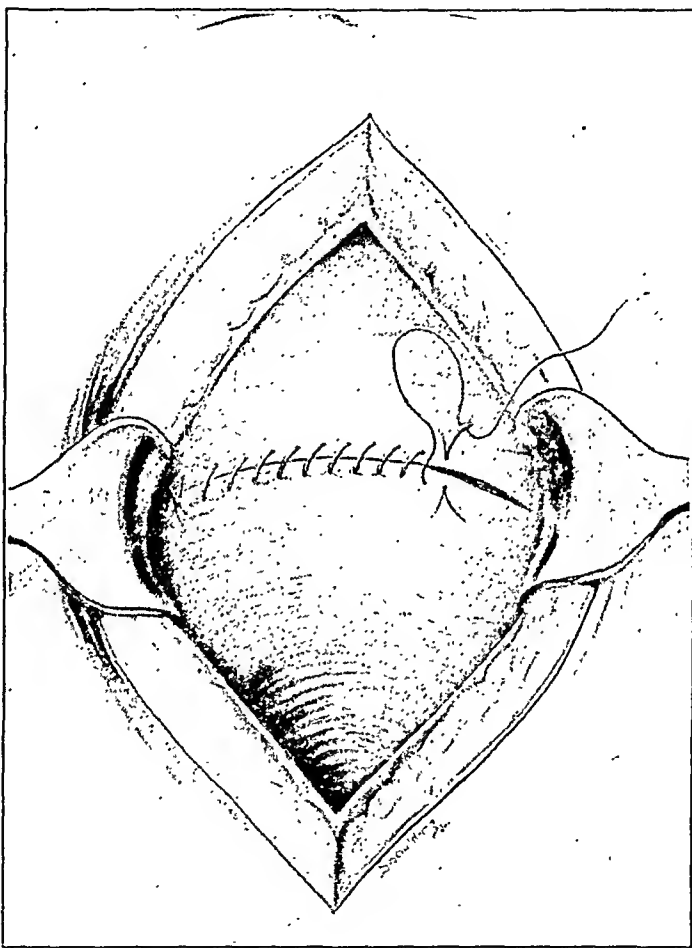


Fig. 5.—Low or cervical cesarean section. The operation is completed by uniting the flaps of peritoneum, upper and lower, with a continuous suture of fine chromic catgut. The flaps are not attached to the uterus so as to facilitate the separation of the bladder in subsequent operations.

ing 9 pounds, 12 ounces, after a labor lasting eleven hours, thirty minutes. The third had had a cervical cesarean for cephalopelvic disproportion. Her second child being premature and smaller than the first, she was delivered by forceps after eight hours of labor. The fourth delivered through the pelvis deserves special mention since she illustrates how much strain may be put on a cervical scar without damage. This woman had had a Veit-Fromme-Hirst cesarean on May 7, 1921, for a flat pelvis, and a floating head after a long labor. The

convalescence was uneventful and both mother and baby were discharged well. She was followed at the prenatal clinic during her second pregnancy and instructed to come to the hospital with her first pains. She disregarded these instructions and was admitted with full dilatation of the cervix and with the vertex presenting at the level of the ischial spines. A right episiotomy was performed and she was delivered of a female child by forceps on November 23, 1923. On account of her hard labor it was decided to keep her in bed an extra week in order to further protect the cervical scar. On the eighth day in the puerperium she got out of bed for the first time, dressed and walked home. All attempts to keep her in the hospital were futile. Her cervical scar had been put to a most severe test, and yet, when she was examined at the clinic a month later nothing abnormal was found.

#### CERVICAL CESAREAN SECTION AFTER A PREVIOUS CLASSICAL SECTION

A previous classical cesarean section is not a contraindication to the cervical operation. In my series thirteen low operations were performed on women previously delivered by a classical section. In these the Veit-Fromme-Hirst technic was followed five times, and the Sellheim eight times. In these thirteen parturients the previous classical scars were discovered as depressions in the uterine body, but all were well healed.

One woman had had a cervical section for cervical dystocia resulting from a previous high amputation on May 13, 1922. On July 18, 1923, a supravaginal hysterectomy, leaving but a wafer of cervix, and double salpingo-oophorectomy were performed for bilateral ovarian cysts and severe uterine hemorrhages. The previous scar in this cervix could not be recognized and there were no abdominal adhesions.

Another patient had a low cesarean performed on May 21, 1923. On July 19 of the same year she had a laparotomy for appendicitis; no adhesions were seen in the pelvis.

In July, 1923, a woman upon whom I had performed a Veit-Fromme-Hirst operation was delivered by a classical section by another operator. The usual band of adhesions was found and the cervical incision was healed as far as could be seen without separating the bladder. It is interesting to note that this patient's first incision was septic, a uteroabdominal fistula had formed, and that drainage had taken place through the abdominal wall. The fistula had closed spontaneously.

#### CONCLUSIONS

From a series of 41 repeated cervical cesarean sections the following conclusions may tentatively be drawn.

1. Perfect healing of the cervical scars and the impossibility to locate the previous line of incision.



2. Definite protection against rupture in subsequent pregnancies and labor.

3. Delivery through the natural passages is possible in many parturients if no disproportion exists. This applies to cases where an abdominal delivery for a relative indication existed with a previous pregnancy. Four patients delivered through the pelvis after a cervical cesarean, one of them three times.

4. The dictum "once a cesarean always a cesarean" does not necessarily hold with this type of operation.

5. The operation may be repeated with ease.

6. No difficulty was encountered in the separation of the bladder a second, third or fourth time with one exception, when the segment was firmly adherent to the abdominal wall and the uterus was entered extraperitoneally.

7. Pelvic adhesions are reduced to a minimum except where the Veit-Fromme-Hirst technic is employed, and even these adhesions do not interfere in performing a secondary cervical section.

8. Abdominal herniae were not observed in any of the 206 cervical operations which I performed.

9. The convalescence is more nearly that of a pelvic delivery, as the lack of handling of intestines reduces shock and distention to a minimum.

10. The protection again peritonitis is a definite factor in favor of the low or cervical cesarean section.

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395 COMMONWEALTH AVENUE.

## LIPIODOL INJECTION OF THE UTERUS AND OVIDUCT\*

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LIPIODOL is a definite chemical compound in which 40 per cent of iodine is firmly bound to poppy seed oil. As a result the lipiodol is nontoxic and noncaustic, and ordinary tests fail to reveal the presence of the iodine. The compound is thoroughly impervious to the



Fig. 1.—The patient, aged thirty-two, had been married ten years without being pregnant. The cervix had been dilated three times for sterility. There was a history of chronic appendicitis. The tubes were inflated in August, 1925, in the clinic, without pneumoperitoneum resulting. Repetition two days later was equally futile. Two weeks later the gas passed at a pressure of 160 mm. of mercury and two days later, at a pressure of 120 mm. The patient returned one year later still sterile. Inflation, after the administration of tincture of belladonna, was followed by the passage of the gas at a pressure of 48 mm.

The roentgenogram shows an anteverted uterus and both tubes well filled with lipiodol which can be seen escaping from the distal end of the left tube.

\*Read before the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Chicago, Ill., September 20-22, 1926.



Fig. 2.

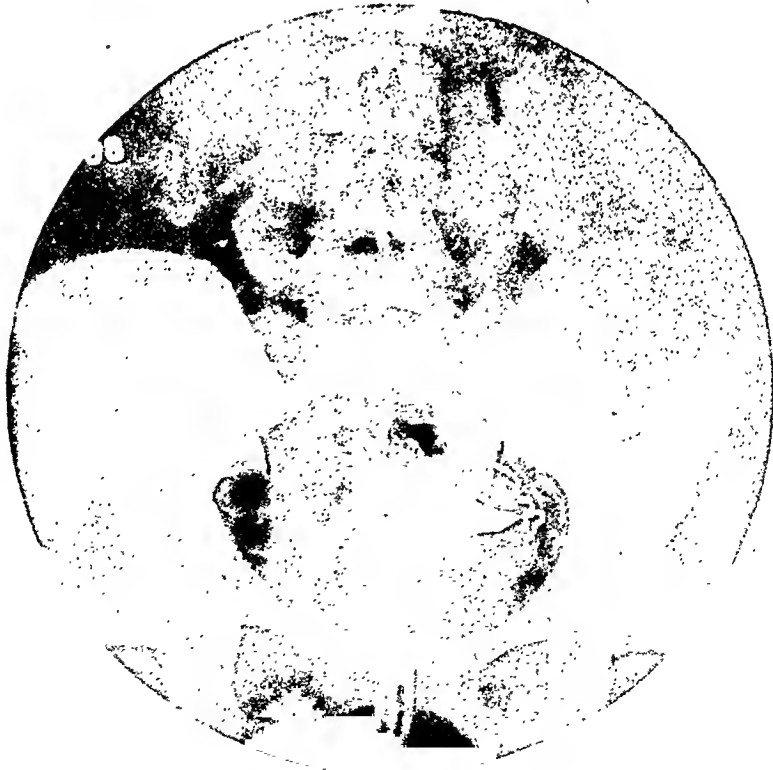


Fig. 3.



Fig. 4.

Fig. 2.—The patient, aged twenty-nine, had been married six and one-half years. One miscarriage had been followed by mild sepsis. No subsequent pregnancy had occurred. Tubal inflation, elsewhere in 1925, was followed by transient pelvic peritonitis. On examination no gross pathologic change was found. The cervix was apparently normal. Tubal inflation carried out twice with a maximal pressure of 200 mm. was futile.

The roentgenogram shows the anteverted uterus well filled with lipiodol and both oviducts filled to the fimbriated end where clubbing is present. There is some lipiodol in the peritoneal cavity.

Fig. 3.—The patient, aged thirty-five, had been married eight years without pregnancy. Peritonitis had followed rupture of an abscess in the left side of the pelvis at the age of thirteen. Dilatation and curettage had been carried out at the age of thirty-two. On examination the uterus was found acutely anteverted and the left adnexa palpable. The Rubin test showed no gas passing at 200 mm. The patient complained of some distress on the left side but none on the right.

The roentgenogram shows the uterus pulled to the left and well filled with lipiodol. The left tube is tortuous and filled in the proximal two-thirds; some lipiodol is evident in the region of the fimbriated end. The right tube contains no lipiodol and there is none in the peritoneal cavity.

This patient was operated upon after returning home and the pathologic findings corresponded to the preoperative conclusion.

Fig. 4.—The patient, aged thirty-eight, had been married fifteen years and had had no children. There was no history of infection. The pelvic examination was essentially negative. The first inflation showed the tubes occluded to 200 mm. pressure, and the second to 265 mm.

The roentgenogram shows a rather large uterine cavity well filled with lipiodol. The right tube is faintly filled for a short distance; the left tube is also occluded. There is no lipiodol in the peritoneal cavity.

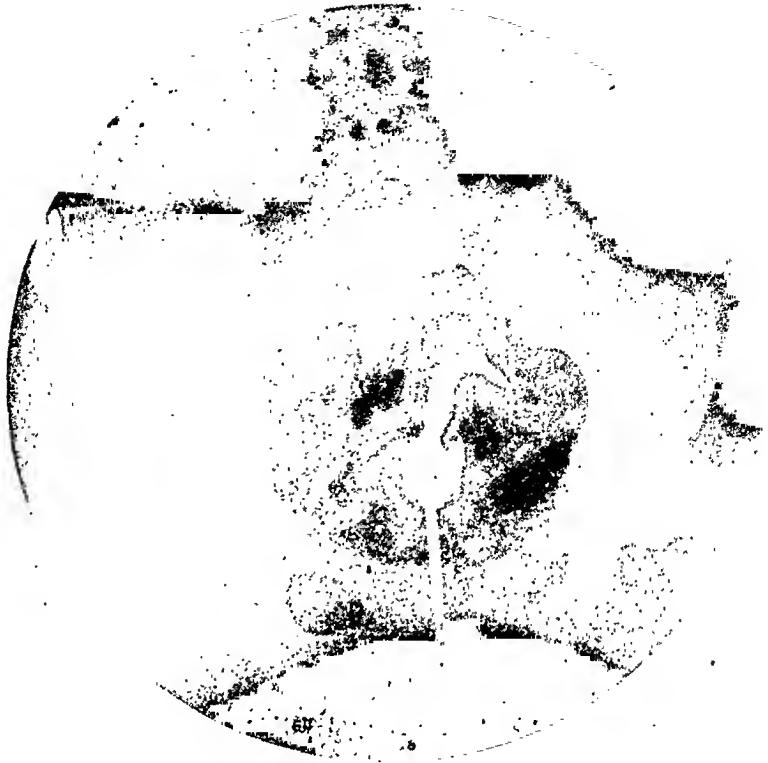


Fig. 5.

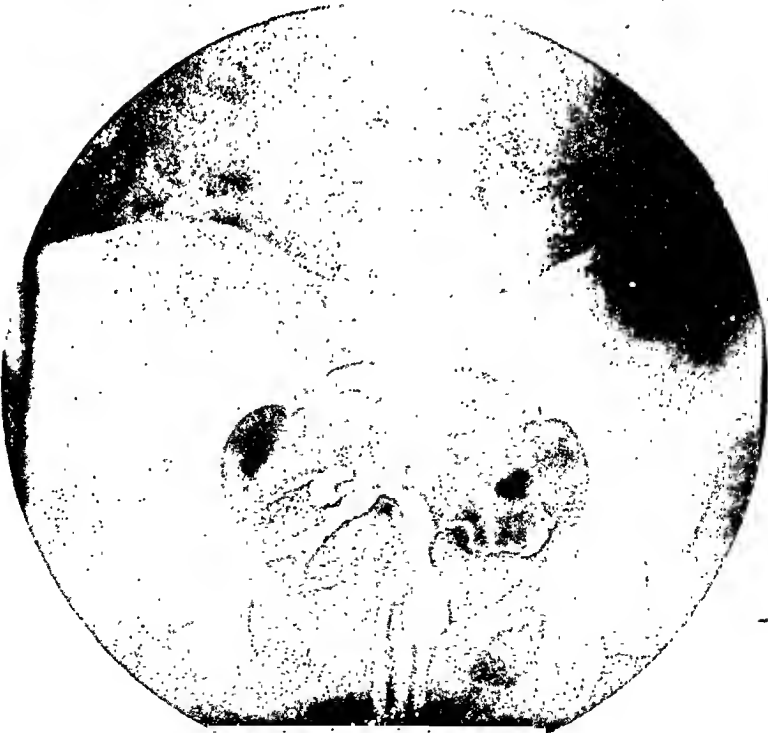


Fig. 6.

roentgen rays. Secard and Forestier employed it in 5,000 cases without trouble save in one case of brain tumor.

Before the advent of lipiodol, various substances were used to depict the cavity of the uterus and oviduct. The method of Kennedy



Fig. 7.

Fig. 5.—The patient, aged twenty, had been married four years. She had had one miscarriage at three months, following an automobile accident five months after marriage. Infection was not believed to have followed but convalescence was slow and operation resulted in the removal of a cyst from the right ovary, a suspension of the uterus, and appendectomy. On examination tenderness was found below McBurney's point. Palpation of the right adnexal region provoked considerable discomfort; otherwise the examination was negative. Patency of the oviducts was not established under a pressure of 200 mm.

The roentgenogram shows the body of the uterus well filled with lipiodol both tubes filled nearly to the distal end, the right more completely than the left. There is no lipiodol in the peritoneal cavity.

Exploration revealed both oviducts to be occluded in the flabiated extremity by small calcareous nodules. The remaining portion of the oviduct seemed quite normal.

Fig. 6.—The patient, aged thirty-two, had been married nineteen years. Rheumatic fever at twelve had been followed by chorea. There had been moderate menorrhagia. The uterus was found to be rather large. Tubal inflation, repeated following the administration of tincture of belladonna, demonstrated occlusion.

The roentgenogram shows an anteverted uterus with irregular contour of the cavity possibly due to fibromyomas. The fundus is septate; the tubes filled to the distal end and both are clubbed. There is no lipiodol in the peritoneal cavity.

Fig. 7.—The patient, aged twenty-seven, and five years married, complained of marked obstructive dysmenorrhea. Appendectomy had been performed nine months previously, at which time exploration of the pelvis had been negative. Dilatation had been carried out five years before for dysmenorrhea and sterility. Two years later it was repeated with curettage. Ovarian extract taken for three years had ameliorated the dysmenorrhea. Thyroid extract provoked cardiac symptoms and was discontinued. The pelvic examination revealed nothing but a rather small uterus. Inflation of the tubes showed occlusion under 200 mm. pressure.

The roentgenogram shows the uterus well filled and inclining to the right. The cornua are distended with the lipiodol but neither tube fills. There is no lipiodol in the peritoneal cavity.



Fig. 8.



Fig. 9.

with sodium bromide suffers only in the lack of clearness of the resulting picture.

Accurate knowledge of the condition of the fallopian tube is necessary to the complete examination of every sterile woman. A careful pelvic examination followed by the Rubin test are the first steps, but they do not definitely determine the point of obstruction, and the



Fig. 10.

Fig. 8.—The patient, aged twenty-eight, had been married ten years. Left tubal pregnancy had been followed by salpingectomy in 1921. There was no history of infection. Pelvic examination showed slight fixation of the uterus which was drawn to the right. A single tubal inflation with a maximal pressure of 200 mm. showed no gas passing into the peritoneal cavity.

The roentgenogram shows the uterus well filled, the fundus broad and inclining to the right, and the cornua distended. The left tube is either absent or occluded at the uterine end. The right tube is tortuous but filled to the fimbriated end where clubbing occurs. There is no lipiodol in the peritoneal cavity.

Fig. 9.—The patient, aged thirty-three, had been married eight years. There was no history of infection. The cervix had been dilated for sterility two years previously. On pelvic examination the cervix was found to be split transversely. Tubal inflation revealed occlusion under 200 mm. pressure.

The roentgenogram shows a good-sized uterine cavity well filled with lipiodol. The left tube is apparently stenosed and fills about half way to the distal end; the right tube fills about one-third of its length and is also stenosed. There is no lipiodol in the peritoneal cavity.

Fig. 10.—The patient, aged twenty-five, had been married five and one-half years. Twin pregnancy one year after marriage had been followed by uneventful convalescence. Miscarriage induced six months later had been followed by pelvic inflammation, since when pregnancy had not occurred. Pelvic examination showed nothing more than mild cystic cervicitis. Inflation of the tubes did not permit the passage of gas into the peritoneal cavity.

The roentgenogram shows the uterus well filled, with rather a broad fundus. Both tubes are filled to the fimbriated end. Left hydrosalpinx is evident. The right fimbriated end is clubbed. There is no lipiodol in the peritoneal cavity.



prognosis of operative treatment remains uncertain. Lipiodol roentgenograms permit more accurate prognosis in cases of tubal occlusion.<sup>3</sup> In the majority of cases of closed oviduct this will be unfavorable, but many patients will be dissuaded from submitting to fruitless operation. In a small percentage of these cases, plastic operation on the closed tube carries with it a reasonable possibility of success. To make the operation justifiable, the site of obstruction should be determined. It usually occurs either in the interstitial portion of the tube or at the fimbriated extremity. If in the former site, operation is

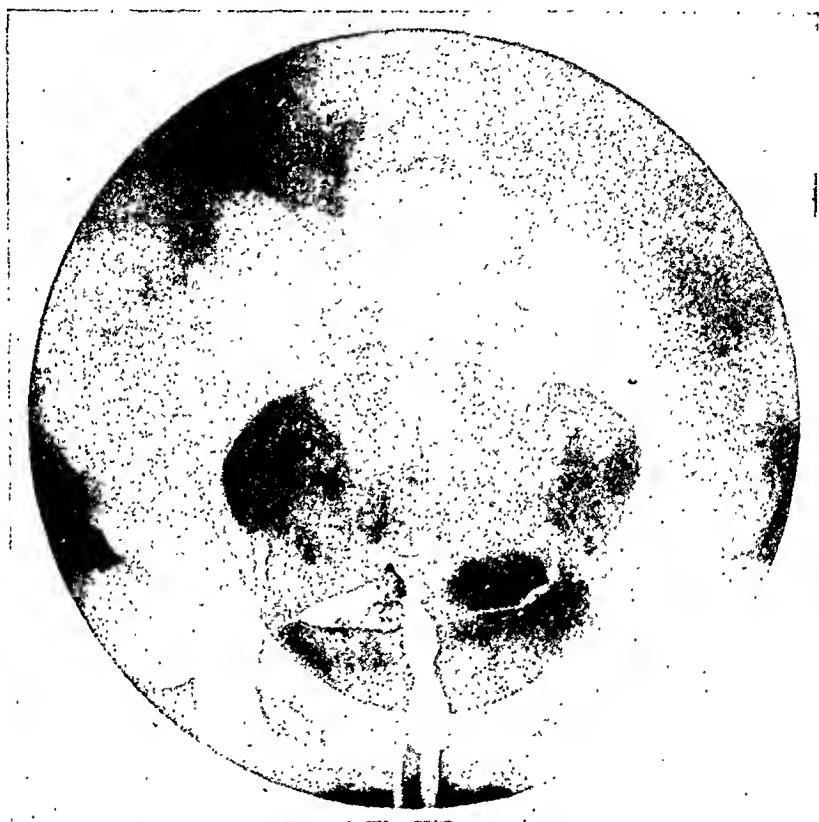


Fig. 11.—The patient, aged twenty-six, had been married three years without pregnancy. There is no history of infection. Pelvic examination was negative. Tubal inflation showed no gas passing under 200 mm. pressure.

The roentgenogram shows the uterus well filled and anteverted and both tubes filled to the distal end but the solution is retained in the clubbed fimbriae. On the left side a small amount has escaped into the peritoneal cavity.

well dispensed with; in the latter, however, operation is sometimes feasible.

Roentgenograms taken following the injection of the cavity of the uterus and oviducts with lipiodol indicate a sharply limited field for the operation of salpingostomy in the treatment of sterility in women. The disrepute into which this operation has justly fallen is in part explained by the entire lack of preoperative information concerning the site of obstruction in the oviduct. No doubt most closed tubes are not amenable to surgical treatment. The extent of the pathologic change in the fallopian tube cannot be accurately determined by

bimanual palpation or by the Rubin test alone. It is neither fair to the patient to refuse operation if there is a reasonable chance of success, nor is it justifiable to employ surgical measures blindly or without securing all available data before operation. Lipiodol injection affords a method of depicting the oviduct and increases our ability to select the candidate for operation properly. If the injection is performed with strict asepsis and the contraindications of the Rubin test kept in mind, no untoward results need occur. It should not be employed as a substitute for the Rubin test and is best limited to those patients in whom occlusion has been revealed by tubal inflation.



Fig. 12.—The patient, aged twenty-four, had been married four years without pregnancy. There was no history of pelvic inflammation. Tubal inflation under a pressure of 220 mm. showed no gas passing into the peritoneal cavity. No better result followed inflation after the administration of tincture of belladonna.

The roentgenogram shows the uterus of normal size and well filled with lipiodol. The oviducts admit the lipiodol for only a short distance; there is none in the peritoneal cavity.

Before investigation has been completed, the fertility of the male must be established and all other reasons for the sterile marriage excluded.

The contraindications to the use of lipiodol are identical with those governing tubal inflation. The injection is carried out under aseptic precautions in the operating room and should be preceded by at least one carefully performed Rubin test. It is preferable to repeat the inflation, however, after administering tincture of bella-

donna to rule out the factor of spasm. This being done, the closure of the oviduct can be fairly attributed to the pathologic change and the lipiodol may be injected twenty-four hours later.

#### TECHNIC

The technic is simple and apparently accurate. A 10 c.c. Record syringe is used and the ordinary inflation cannula fitted to it. Ten c.c. is ample for an injection, the average amount used being 5 to 6 c.c. The cervix uteri is caught with a tenaculum after being exposed with a bivalve speculum. The cervical canal is thoroughly cleansed with dry cotton applicators after which tincture of iodine is applied and wiped dry. The cannula is inserted after all air has been expelled from the syringe and cannula. Gentle pressure is made on the plunger until the patient complains of uterine colic. Pressure is then released for a moment and reapplied until the same reaction occurs. This is repeated once more and the picture taken with the cannula still in place.

Roentgenograms of the pelvis are made with the patient in the same position as for the injection, care being taken to see that she does not move or breathe during the exposure. I have found it most convenient to use an ordinary bedside unit for it is then unnecessary to move the patient and there is no danger of escape of the lipiodol from the cervix. Roentgenograms by this method have been uniformly successful. Should there be any question of lipiodol in the peritoneal cavity, roentgenograms should be taken again twenty-four hours later.

#### RESULTS

Lipiodol has been used for the last six months in the Mayo Clinic and during this time the Rubin test was made in eighty-five cases. In eighteen of these women with closed oviducts, the tubal inflation was followed by lipiodol injections and roentgenograms.

On the basis of the findings in roentgenograms following the injection of lipiodol, six of the eighteen women mentioned might expect success from operative treatment, if the tubal condition alone were considered. One of these was refused operation because the husband's Wassermann test was positive. Another had a fibroid uterus which was believed to prejudice her chances. Of the remaining four, two have been operated on, one at the Mayo Clinic and the other elsewhere. The former is now four months' pregnant. In both of these cases, the pathologic changes evident at operation confirmed the preoperative diagnosis made by roentgenogram.

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## PUERPERAL INFECTION DUE TO ANAEROBIC STREPTOCOCCI\*

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Barnes Hospital)

IN STUDYING patients with puerperal infection we were frequently impressed with the fact that in cases in which there could be no doubt about either the uterine or blood stream infection, the bacteriologic examinations were negative. As a result of this experience we felt that both uterine and blood cultures should be incubated both aerobically and anaerobically. This work has now been carried on since July, 1924, when the Obstetrical Service took over its own bacteriologic work.

We reported in a preliminary paper our experiences with anaerobic organisms at the meeting of the Southern Medical Association in November, 1925. In this article we reviewed particularly the previous work of Schottmüller in detail. We were surprised to find that up to that time there had been little or nothing written in the English and American literature about the rôle of anaerobic streptococci in puerperal infection. In our preliminary report concerning infections due to anaerobic streptococci we were able to confirm all of Schottmüller's statements regarding the characteristics of these infections, although our experience at that time was still limited. In this short period of time anaerobic streptococci played the greatest part by far in our cases of puerperal infection. We were surprised at this finding because we had felt, like others, that Schottmüller's experience was perhaps exceptional and that these organisms played only an unimportant part in the incidence of puerperal infection.

It is our object in this paper to present our experience with these infections up to this time, which covers a period slightly more than two years. It may be well to mention first the description that Schottmüller gives of the organism which he terms the *Streptococcus putridus*, which is an anaerobic streptococcus. Before doing this, we wish to state that in many of our cases we isolated this specific organism, but there are other types of anaerobic streptococci which we have encountered which are *also* able to produce pathogenic lesions, but do not do this to the degree which the organism which Schottmüller describes.

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\*Read at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, held in Chicago, Ill., September 29-30, 1926.

In 1910, in his first paper, Schottmüller reported a total of twenty-five cases, with a mortality of thirteen, or 50 per cent. Seventeen cases of puerperal infection, with seven deaths, or 41 per cent. In cases of puerperal thrombophlebitis due to anaerobic streptococci, he reported a mortality of 78 per cent. He indicates that the anaerobic streptococcus is a virulent pathogenic organism and cannot be regarded as a parasite, because once having invaded the thrombi or blood stream it has pathogenic properties. His description of the organism is as follows: On artificial culture media it forms long and short chains. The individual organisms are usually not round but flattened and lie opposite one another (diplococci); eight, ten, or more diplococci form at times a tortuous chain. The single cells do not always have the above described forms but at times on cultures they become rod-shaped and all different shapes, so that one is forced to believe that the culture is contaminated. They stain readily and are gram-positive. The organism does not grow in the presence of oxygen, but on the contrary, it is so sensitive that it grows only after expulsion of all the oxygen. For this reason only those methods can be used in which all the oxygen is removed and kept away. These requirements are best met in agar. The usual mixture of a stab culture to which a reducing substance has been added is the best media on which to grow this streptococcus.

Since 1903 Schottmüller has been successful in obtaining this organism in the blood from a number of serious cases of puerperal infection. The blood was placed immediately in bouillon and without further handling, in the incubator. In this apparent aerobic condition streptococci grew, but on broth cultures were obligate anaerobes. Naturally they were anaerobic from the start and the growth in the broth was only apparently aerobic. The anaerobic character of these cultures, although apparently under aerobic conditions, was due to the fact that the venous blood which quickly clotted or settled to the bottom excluded the oxygen from the cocci so that they found excellent growth conditions. Growths are obtained in twenty-four hours and a much better growth is seen in forty-eight hours in the anaerobic zone of the agar tubes.

The *Streptococcus putridus*, as Schottmüller has named this organism, causes a putrid odor, particularly in blood bouillon cultures. The blood takes on a characteristic poppy-red color and in the spectrum one can demonstrate hydrogen sulphide. In about ten days the blood cultures are black in color. The last described property of the *Streptococcus putridus* is exceedingly characteristic. The pus or blood in which the *Streptococcus putridus* is growing always has a foul odor which is due to the formation of hydrogen sulphide.

His experience shows that the *Streptococcus putridus* infections most frequently follow abortions. He feels that this indicates that in abortions the organisms are introduced into the uterus either with the hands or with instruments. He emphasizes that most of these abortions were criminal and the infection of the uterus from the vagina is self-evident. He states that the occurrence of anaerobic streptococci in the normal vagina has been proved and therefore auto-infections can occur. The subsequent invasion of the uterus is also

possible, and fatal autoinfections of *Streptococcus putridus* can occur. He points out that in abortions only 3 per cent die, which indicates that the uterus in early abortion is not so easily infected as at term. The thrombosed vessels in the endometrium at term are much more numerous and larger. Naturally the mortality is higher in these patients. He feels that the site of entrance of the *Streptococcus putridus* in these cases of thrombophlebitis is always by way of the endometrium. Here the organism invades the uterine wall, parametrium and thrombosed veins. The thrombosed veins in contradistinction to the circulating blood, offer a fine culture medium. The proliferating organism dissolves the thrombi and small particles break off and gain access to the blood and other organs, particularly the lungs.

The work of Schottmüller was confirmed on a small scale by several workers before the onset of the World War. In 1921, an article appeared from the Schottmüller Clinic by Bingold, in which the pathogenicity of the *Streptococcus putridus* was further emphasized. The extent to which this work has now been carried out at the Schottmüller Clinic is very clearly brought out in a monograph by Schottmüller on cultural methods, which was published in 1923. This shows that in 231 fatal puerperal cases following labor the *streptococcus putridus* was present 72 times. In 41 of these cases death was due to peritonitis. The *Streptococcus putridus* in this series was present seven times in mixed infections. This is in marked contrast to the experience following abortions. In 600 cases of infected abortion the *Streptococcus putridus* was found only 4 times in pure culture and 300 times in mixed infections.

It is the object in this paper to point out the frequency with which we have met with anaerobic streptococci and to illustrate some of our typical cases from a pathologic and bacteriologic standpoint. We

TABLE I  
RESULTS OF CULTURES FROM PUERPERAL PATIENTS

NUMBER OF CULTURES	NUMBER OF CASES	NEGATIVE CULTURES	POSITIVE CULTURES					
			AEROBIC			ANAEROBIC		
			NUMBER OF CULTURES	NUMBER OF CASES	NUMBER OF MIXED CULTURES	NUMBER OF CULTURES	NUMBER OF CASES	NUMBER OF MIXED CULTURES
Blood 200	68	146	15	6		39	11	
Uterine 60	54	8	12	12		35	35	1
Pelvic abscesses 10	10	1	2	3	1	4	6	2
Peritonitis 8	7		2	2		5	5	
Post- operative wound infection 9	9		3	3		5	6	1
Urine 20	18	4	12	12		2	3	1

TABLE II  
TYPES OF PUERPERAL INFECTION

NUMBER OF ADMISSIONS JULY 1, 1924, TO SEPT. 1, 1926		NUMBER OF DELIVERIES	NUMBER OF CASES OF PUERPERAL INFECTION		NUMBER OF DEATHS	
2194		1913	45		10	
TYPE OF INFECTION	NUMBER OF CASES	AEROBIC BACTERIA	ANAEROBIC STREPTOCOCCI	MIXED BACTERIA	NEGATIVE CULTURES	MOR- TALITY
Acute endometritis	42	11	27	3	1	0
Pelvic cellulitis	11	4	6	1		0
Peritonitis	7	1	4	2		6
Pelvic abscess	3	1	1	1		
Pelvic thrombophlebitis	9	0	6	0	3	3
Bacteremia	15	4	10	1		1

feel that we are in no position to definitely advocate any procedure as regards radical treatment in these cases, because we have been handling cases of this type entirely conservatively. Our present experience, however, has led us to a certain definite decision as to the method of handling these cases in the future. Our complete experience over a period of twenty-six months can best be appreciated by studying Tables I and II, which outline the bacteriology of our cases of puerperal infection. It can readily be seen from these tables that anaerobic organisms played a very considerable part in the cases of puerperal infection that we have studied during this time. In these tables we have not classified the various types of anaerobic streptococci which we have found but have placed them under one group.

These organisms vary somewhat in cultural characteristics and in the severity of the clinical lesions. The organisms, however, which answer the description of the so-called *Streptococcus putridus* of Schottmüller (anaerobic) which we have encountered, usually give rise to rather virulent infections, particularly if a thrombophlebitis develops with a resulting pyemia. The difference in the severity of these infections, particularly in cases of thrombophlebitis, apparently depends upon the degree of the ability of the organisms to digest thrombi. This property, we feel, influences the treatment of the case materially and we shall discuss this further, when taking up the treatment.

The anaerobic streptococci found by us were all obligate anaerobes, usually growing only on enriched media. They varied in size from  $0.2 \mu$  to  $3 \mu$ . The most common occurrence was in pairs with chain formation influenced by the media. Some tended to be pleomorphic. This is true particularly of the *Streptococcus putridus*. The majority recovered were gram-positive, although in old cultures there might be gram-positive and gram-negative organisms in the same chain.

We have not been able to classify the anaerobic cocci except roughly, using the proteolytic powers of the organisms as an index. Prevot has published a table, classifying them according to their

action on different types of media, but certain classes apparently overlap.

One organism in particular has been encountered very frequently by us. It is a very small, gram-negative anaerobic coccus (or coccobacillus). In a small series of eight obstetric patients it was found six times in the vagina and three times in the cervix. We have recovered it with certainty in twenty-two uterine cultures and nine blood cultures. This organism produces a black pigment on blood agar media, which is probably melanine. In pure cultures it produces little if any hemolysis, but in symbiosis with other organisms, particularly other anaerobic cocci, its hemolytic properties are tremendously increased. For example, in forty-eight hours a blood agar slant in its entire thickness will be completely decolorized. It may be that the marked blood destruction shown in some of our cases was due to this organism in symbiosis with others.

On examining the tables it will be seen that anaerobic streptococci were isolated from the blood in eleven cases as compared to six cases of other pathogenic organisms. The uterine cultures in thirty-five cases showed anaerobic streptococci, while twelve cases showed other aerobic pathogenic organisms. In comparatively few instances was there more than one organism isolated from uterine or blood cultures. Anaerobic streptococci were recovered in six cases of pelvic abscess and five cases of peritonitis. During the period of our study there were ten deaths which occurred in our cases of puerperal infection. Five cases were due to anaerobic streptococci which were recovered in pure culture. Anaerobic streptococci were found in three other fatal cases, but associated with other organisms. Three of the deaths were due to thrombophlebitis with resulting pyemia, and in one instance there was a severe case of peritonitis which terminated very rapidly. These latter four cases are described both by chart and case histories as well as by pathologic material. Two of these cases we reported in a previous paper. In our series one case which developed lung involvement due to a thrombophlebitis and pyemia recovered and we have included this case in our descriptions.

In reviewing this work we are of the opinion that anaerobic streptococci play a considerable part in puerperal infection. The infection caused by this organism in most instances remains confined to the endometrium. We feel, in our experience, that fewer of these cases developed thrombophlebitis because they were rather promptly treated in respect to their uterine lesion. In any case where there is a profuse foul-smelling discharge we have made it a point at the time we obtain our uterine culture to remove retained secundines or clots by digital means or by the use of a blunt curette, followed by a 1-4000 potassium permanganate douche. We feel that early in these infections the organism is rather superficial and by removing the dead



material on which it can grow we have done much to prevent the spread of this infection.

In our cases of thrombophlebitis we had hoped, on account of the saprophytic character of the organism in the noninvasive state, that the virulence of the organism might become exhausted and we felt that by supporting the patient with frequent large blood transfusions and keeping up her nutrition by forced feeding the infection would at length terminate favorably. Four cases have been handled in this manner, with one recovery. We had expected better results since from time to time we have had rather gratifying results in both local and general infections due to the *Streptococcus hemolyticus*. Ligation of the internal iliac veins as well as the ovarian veins, as at first suggested by Bumm, was carried out in a number of cases in Schottmüller's Clinic. The results were not gratifying. Perhaps the conditions under which the ligation was carried out were not good.

The whole subject of operative treatment in puerperal thrombophlebitis and pyemia was reviewed in an excellent paper by C. Jeff Miller in 1917. He collected 197 cases from the literature. Fifteen were treated by extraperitoneal and 182 by transperitoneal operation. The gross mortality was 51.6 per cent. What he terms the corrected mortality was 33 per cent. In a discussion of this paper, Barton Cooke Hirst of Philadelphia stated that he was of the opinion before hearing Dr. Miller's paper, that by ligation of the pelvic veins no advantage could be gained. The mortality with this operation has been very discouraging. After hearing Dr. Miller's paper, however, the record was much more favorable than he had expected. He stated that after carefully considering the subject and reading what literature was available, he regarded the matter as a thing adjudged and practically dismissed it from his mind, but after hearing the scholarly address of Dr. Miller he felt that he would be compelled to take up the consideration of this subject once more. He was not convinced that this procedure could be advocated but was much more open to conviction after hearing Dr. Miller's paper.

In 1922, Baldwin, before this Society, reported his results in operative treatment of puerperal infection. He reported 67 cases, with 47 recoveries. He treated these cases by hysterectomy and with free drainage of the infected veins. His series, however, was not limited to cases of pelvic thrombophlebitis, but rather pelvic infection in general and therefore does not come under the present discussion.

We have come to the definite conclusion that we shall in future cases of pelvic thrombophlebitis due to anaerobic organisms, particularly the *Streptococcus putridus*, attempt ligation of all pelvic veins. If the patient's condition justifies further procedure we shall remove the infected uterus with the tubes and ovaries, both to remove the infection of the uterus and to limit the degree of pelvic edema which

results from ligation of this kind. The point and the time at which to ligate has puzzled us considerably as we have had it under discussion in all of the cases of our present series. We feel now that if the best results are to be obtained from such a procedure, it must be done

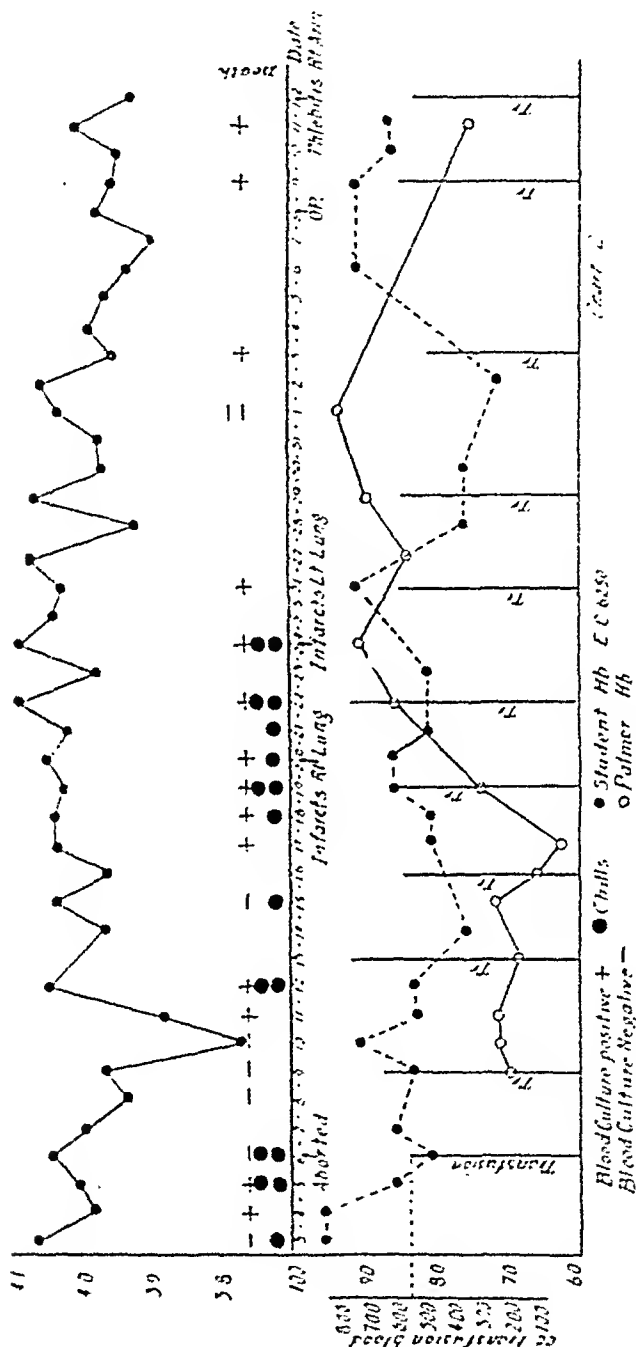


Fig. 1. Case 1.

as soon as the organism has been recovered from the blood stream in connection with a chill. We also feel that it is important to cleanse the uterine early in the manner previously mentioned, in all cases which have a profuse foul discharge. In this manner, we think we can in great measure prevent the spread of this infection to the deeper structures.

We have also observed that the infections from these organisms occur after full-term labor in cases where there has been a long drawn-out labor, or delayed labor, particularly in cases where the



Fig. 2.—Case 1. Section of right lung showing numerous small lung abscesses. The largest cavity in the picture shows a marked destruction of tissue in the center cavity lined by a definitely pyogenic membrane around the periphery.



Fig. 3.—Case 1. Shows high power of pyogenic membrane of largest cavity of Fig. 2. The large dark areas in the lower portion of the picture indicate large groups of bacteria.

membranes have been ruptured either early in labor or previous to this time. Also that these cases appear almost entirely on our ward service in patients of the less clean type. It has been demonstrated

by Wegelius and others that the vagina frequently harbors anaerobic streptococci and we felt from the incidence of these infections and the absence of infections due to other pathogenic organisms in our series indicates that the patient is harboring these organisms herself. We also wish to emphasize that in many of these cases we have performed rectal examinations and believe that if such organisms are present in the vagina we are more apt to contaminate the uterine by rectal examination than by direct examination of the cervix through the vagina.

We feel that the proper incidence of various types of infections in the puerperium can only be determined by a careful bacteriologic study. The making of uterine and blood cultures in suspected cases,

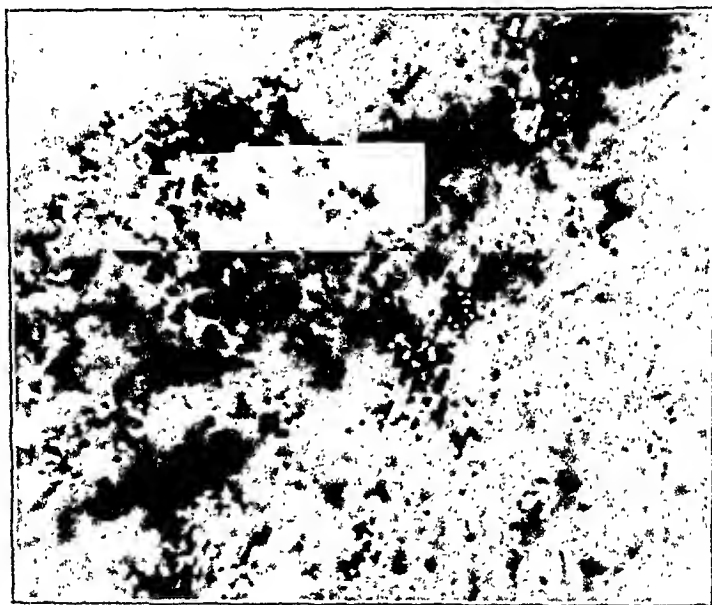


FIG. 4.—Case 1. Oil immersion of Fig. 3. Anaerobic streptococci well shown in this field.

particularly of thrombophlebitis, will give better indications what case should be ligated and at what time. In this way much may be done to improve the only fairly satisfactory figures which have been reported thus far.

*Technic for Cultures.*—The routine which we have established in uterine cultures is briefly as follows: the patient is placed crosswise on the edge of the bed and the genitalia are thoroughly cleansed and dried. They are then painted with picric acid solution, or 2 per cent mercurochrome solution. Preferably a weighted speculum is placed over the posterior vaginal wall and a flat anterior speculum is inserted. The vaginal portion of the cervix, the external os and a short portion of the cervical canal are carefully dried and painted with an antiseptic solution, again dried, and a Little's tube (usually two culture tubes are taken) is then carefully inserted into the uterus and the lochia aspirated. The tube is sealed, taken directly to the laboratory, and the contents transferred to: (1) blood agar plate; (2) anaerobic blood agar slant; (3) meat tubes, tubes containing meat and broth which

have not been filtered. (The third method was suggested by Dr. Howard Bell, formerly of the Department of Pathology.)

**Blood Cultures.**—We use 100 c.c. of veal infusion broth containing 0.1 per cent glucose. This is kept in 200 c.c. Florence flasks which have been covered with cotton and paper to prevent contamination. We take from 10 to 20 c.c. of blood, preferably the latter, and add it to the broth. The latter is again covered and placed in the incubator and not shaken. Blood cultures are preferably taken during, or immediately after a chill; or if there are no chills, at the height of the temperature. They should be taken frequently. Schottmüller recommends 300 x 50 mm. tubes (we use 210 x 27 mm.) which are then filled with 2 per cent glucose agar to which he adds 10-20 c.c. of blood, cools immediately and places in the incubator.

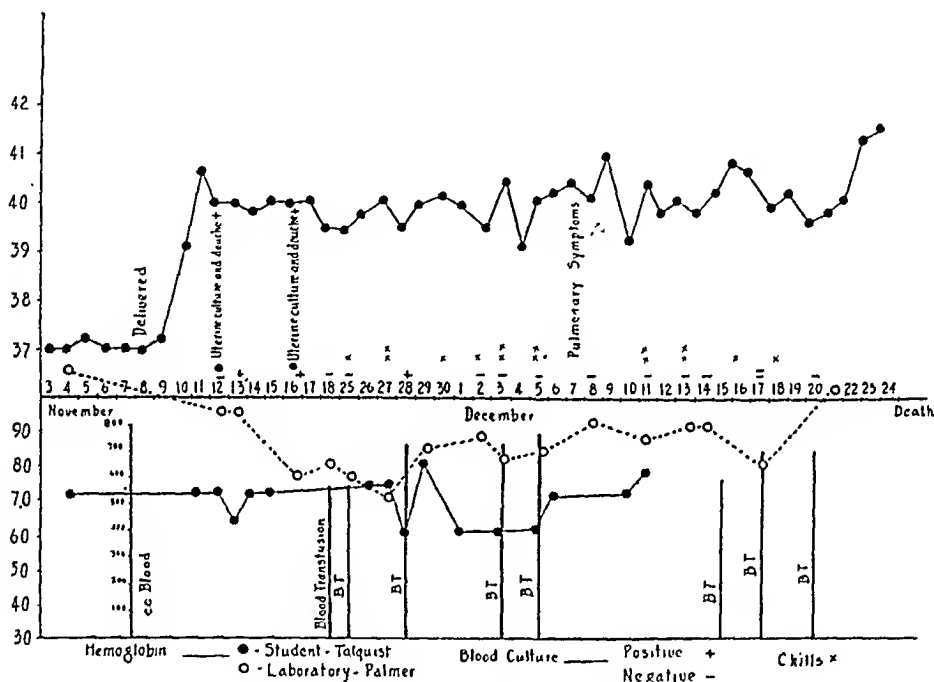


Fig. 5.—Case 3.

### CASE HISTORIES

**CASE 1.** (Fig. 1.) Patient entered hospital with a history of being three weeks overdue and of having inserted a slippery elm stick into the uterine cavity on Nov. 30, 1924 for about one minute. The following day she began to have fever. On Dec. 2, 1924 she had chills. Blood culture on Dec. 4, 1924 was positive, giving same organism as was recovered from uterus. Diagnosis of incomplete abortion, acute endometritis (*Streptococcus putridus*), pelvic thrombophlebitis, bacteriemia (*Streptococcus putridus*), infarcts of lung, abscess of back and thrombophlebitis of veins of arm. She was treated with transfusions, mercurochrome and neoarsphenamine, but died Jan. 13, 1925 (44 days after introducing stick). Wbc. 10,000-25,200.

**Autopsy.**—The abdomen and pelvis were essentially negative. The entire lower lobe of right lung was firm and on section showed numerous infarcts and abscesses. Left lung showed at base an area of consolidation, which on section showed small abscesses. No definite sinus tract from right lung to scapular region, but right lung was densely adherent throughout and consensus of opinion was that abscess either resulted from rupture of empyema or was due to direct extension.

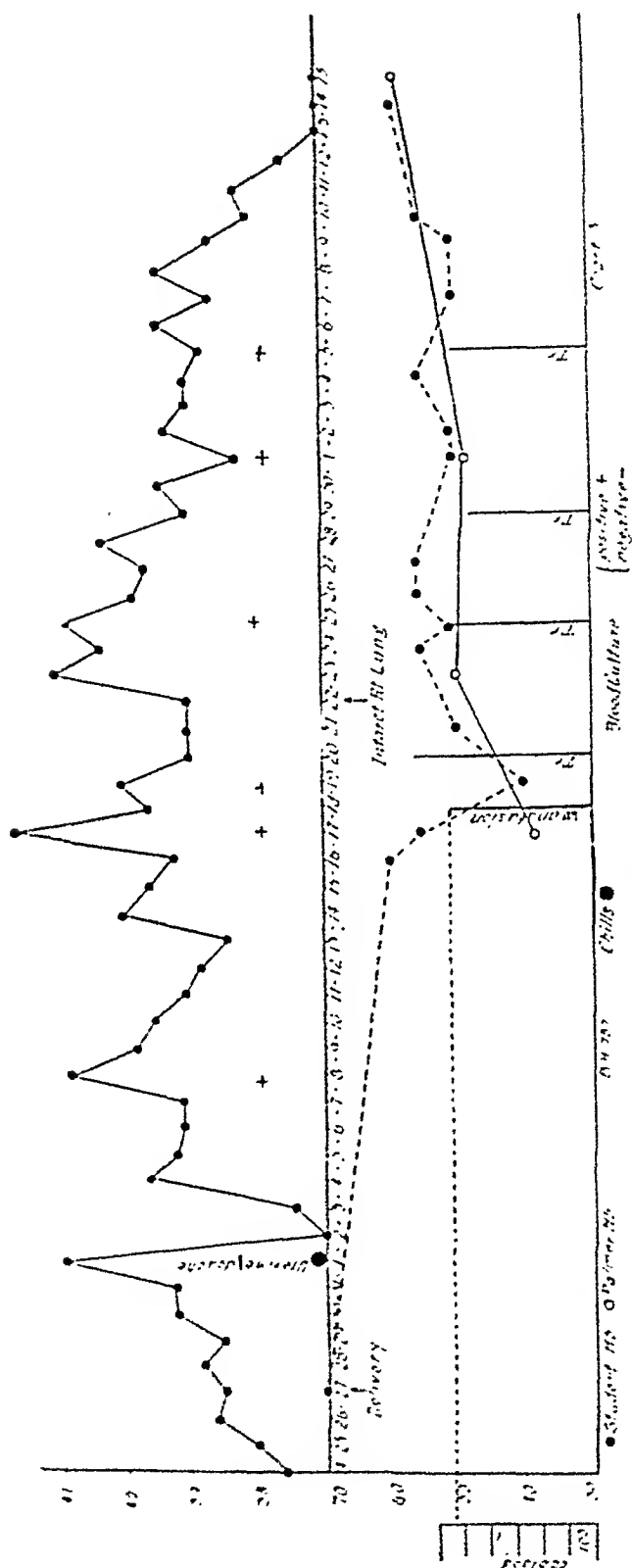


Fig. 6.—Case 2.

CASE 2. (Fig. 6.) Patient entered hospital Aug. 24, 1925, having irregular contractions. She was delivered on Aug. 27, 1925 of twins after labor of fifty-four hours, first by perineal forceps and second by version. Membranes had ruptured spontaneously some time on Aug. 25, 1925. Her temperature was 38° C. before delivery, and was normal for two days following uterine irrigation on Sept. 1, 1925.

Diagnosis of acuto endometritis (anaerobic streptococcus), pelvic thrombophlebitis, bacteriemia (anaerobic streptococcus), and infarcts of lung. Treated with transfusions. Discharged well on Oct. 19, 1925, Wbc. 13,100-28,500.

CASE 3. (Fig. 5.) A gravida iii, entered hospital Nov. 3, 1925 for induction of labor. At term Dec. 12, 1925 from menstrual history. Uterus was the size of a full term gestation. Had a normal pelvis but had had a mild hypertension throughout pregnancy, with loss of weight during last month. On Nov. 8, 1925 patient went into labor following administration of castor oil and quinine. She was delivered of twins Nov. 8, 1925 after labor of three and one-half hours. First baby delivered spontaneously, second delivered by breech extraction. Temperature of 39.1° C. on Nov. 8, 1925, considered a pyelitis at first. On Nov. 11, 1925 a small indurated mass was palpated high up on right side in base of broad ligament. On

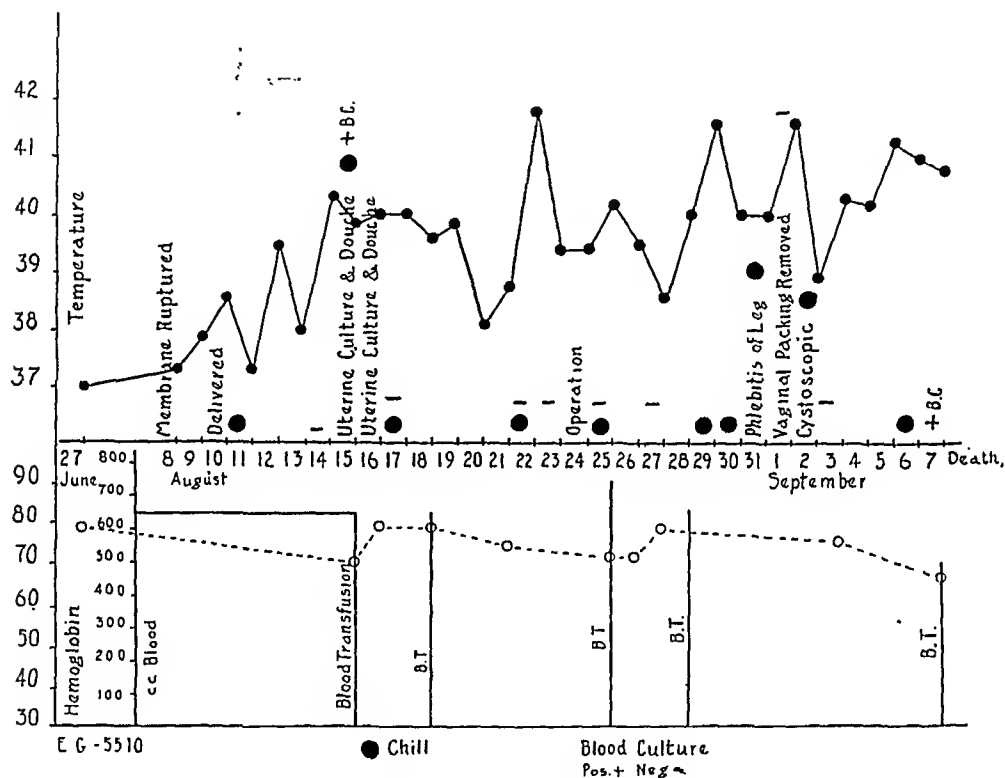


Fig. 7.—Case 4.

Nov. 12 an intrauterine culture and douche were carried out. Culture gave an anaerobic gram-positive diplococcus and a tiny anaerobic gram-negative coccus. Blood culture on same day after a chill gave anaerobic gram-positive diplococcus. On Dec. 7, 1925 patient had clinical signs and symptoms of pulmonary infarct. On Dec. 10 slight icterus was noted which progressively increased. On Dec. 18 a phenoltetrachlorophthalein test was normal. There was no urobilinuria although plasma gave a three-plus bile pigment test. In spite of frequent transfusions, intravenous glucose, and neoarsphenamine, patient died on Dec. 24, 1925.

CASE 4. (Fig. 7.) A gravida vii, due August 8, entered hospital on account of marked varicosities of the legs on June 21, 1926. She was kept in bed with legs elevated. Irregular contractions over a period of five days, beginning on Aug. 5, 1926. Membranes ruptured spontaneously fifty-one hours before delivery, with head not engaged. Delivery was spontaneous on Aug. 10, 1926. On Aug. 12 had marked abdominal distention. On Aug. 14 peritonitis was suspected and treatment instituted for that condition. On Aug. 16 a uterine culture was taken and a douche



Fig. 8.—Case 4. Typical thrombosed vein, inner third of uterus. Well organized and showing moderate degree of invasion by leucocytes. Every vein in this region was thrombosed, indicating a very abnormal process.



Fig. 9.—Case 4. Markedly infected thrombus undergoing digestion. Outer third of uterus, one-half right posterior wall, one-half cm. above supravaginal resection. Countless streptococci demonstrated by oil immersion.

given. Some induration and tenderness was found in left adnexa. On Aug. 18 a diagnosis of pelvic thrombophlebitis was made and in view of the positive blood culture (*Streptococcus putridus*) ligation of the pelvic veins was considered. In view of the patient's apparent good condition this was postponed until Aug. 24, 1924, when the uterus was removed. Ligation of the internal iliac veins was at-



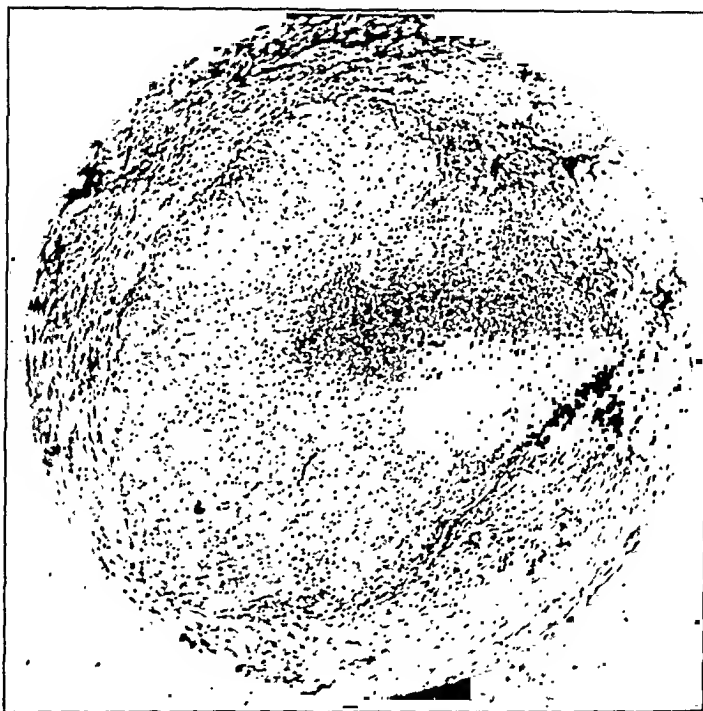


Fig. 10.—Case 4. Right posterior wall of uterus in region just above lesion of Fig. 9. Well organized thrombus, hyalinization. One area to left still showing a marked inflammatory process.



Fig. 11.—Case 4. Old organized thrombus undergoing dissolution as a result of marked inflammatory process still existing.

tempted but given up on account of a markedly dilated ureter together with induration. After removal of the uterus by supravaginal hysterectomy, together with removal of both adnexa, the cervix was split and the pelvis packed loosely with iodoform gauze. Sept. 1, 1926 a phlebitis developed in the right leg. On this day



Fig. 12.—Case 5. Drawing from pelvic organs removed at autopsy. Posterior to the uterus is seen a large abscess cavity lined by fibrinous exudate. Rubber drainage tube in place, inserted through the vagina after culdesac drainage. Note how the exudate involves the sigmoid and intestines. Anaerobic streptococci of Schottmüller were predominant organisms in this case, and an unidentified anaerobic bacillus was also found. None of the well known pathogenic organisms were recovered in this case.



the packing was removed. Cultures of urine gave *B. coli*. Smear of urinary sediment gave a gram-positive streptococcus. The patient died on Sept. 7, 1926. Although râles were present throughout the course, definite clinical symptoms of lung infarcts were never noted. No general peritonitis after operation. Cultures from cavity, wall and a thrombosed vein gave a gram-positive streptococcus and also *Streptococcus putridus*.

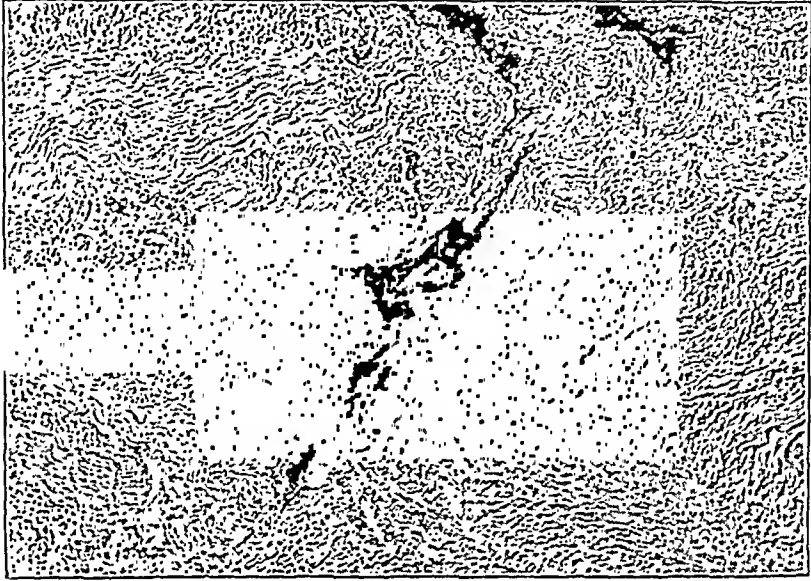


Fig. 14.—Case 5. Middle third of uterus showing lymphatics plugged with bacteria.

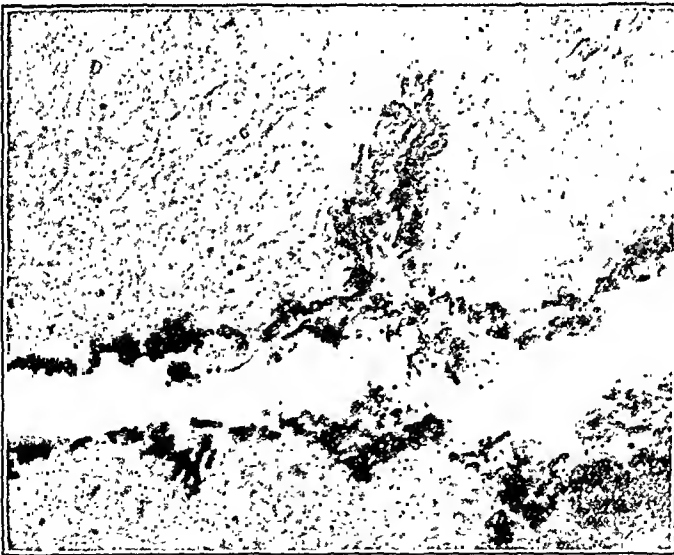


Fig. 15.—Case 5. Oil immersion of Fig. 14. Showing short chain streptococci.

*Gross Description of Uterus.*—Uterus removed by vaginal hysterectomy, measures 11x8x7 cm. in fixed state. On opening the uterus symmetrically it was found to be filled with a sanguinous exudate which was adherent in part to the placental site; the latter was elevated about 0.5 cm. above the lining of the cavity and had a ragged, greyish-yellow appearance. The lateral portion of the uterus showed no extensive thrombosis. Neither did the upper portion of the uterus show any gross evidence of extensive thrombosis or evidence of an inflammatory exudate. On cut-

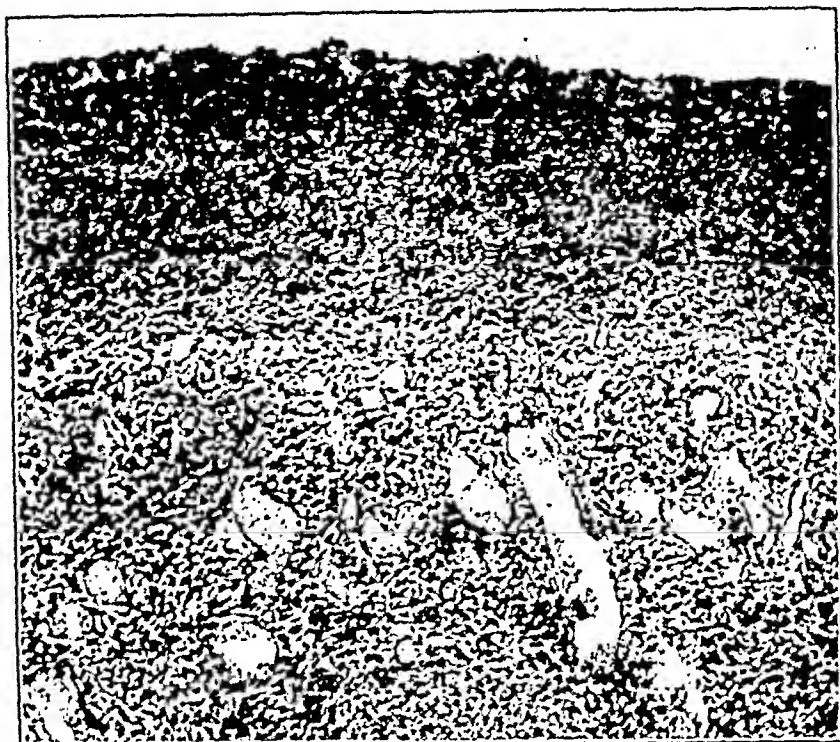


Fig. 16.—Case 5. Outer third of uterus with peritoneal exudate.

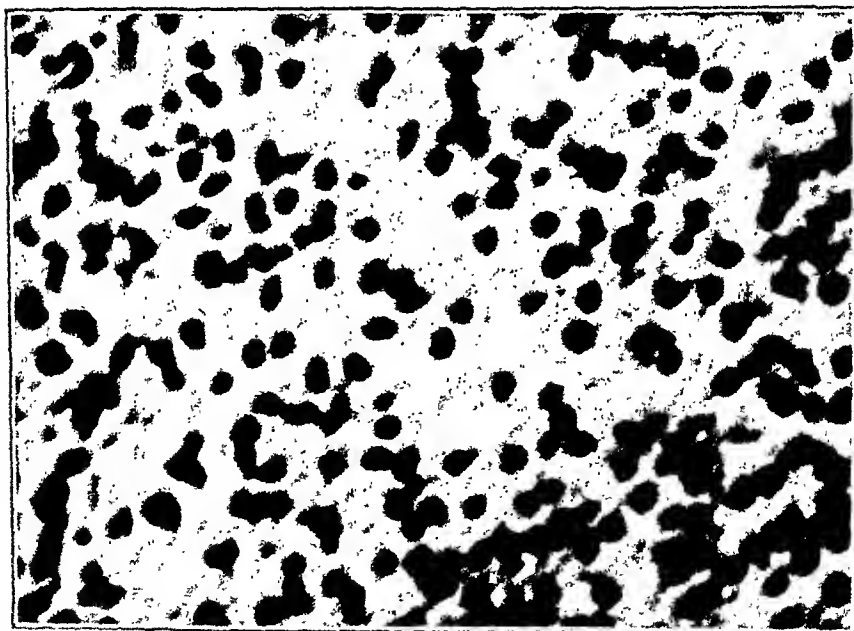


Fig. 17.—Case 5. High power of Fig. 16. Peritoneal exudate made up chiefly of fibrin and mononuclear cells and comparatively few polynuclear leucocytes. The absence of polynuclear leucocytes is explained by the peculiar ability of the anaerobic streptococci of Schottmüller to digest them.

ting through the placental site it was found to be studded with numerous thrombi in the small vessels as well as in the vessels with a diameter as great as 15 mm. In the lower posterior wall of the uterus near the midline just above the point of amputation was an abscess filled with purulent material, which measures  $\frac{3}{4}$  cm., in diameter. In the adjacent tissue immediately surrounding the abscess for a distance

of 1 cm. on both sides the tissue is filled with numerous tiny abscesses varying in size from pin point to about 2 mm. in diameter.

*Microscopic Examination.*—Section through the placental site showed all veins filled with thrombotic processes in various stages of organization and with varying amount of infiltration with inflammatory cells. The veins of the inner third of the uterus at this point were also involved with the thrombotic processes. The uterine musculature in the upper portion of the uterus showed no evidence of inflammatory process, nor was there any evidence of peritonitis. There were collections of polymorphonuclear leucocytes found in some of the lymphatic vessels. This process was in no sense marked. The area on the posterior portion of the uterus just above the amputation in which numerous small abscesses were seen on section showed that these abscesses were limited to the thrombotic processes in the veins in this region. In some instances the vessel wall had been destroyed and the adjacent tis-

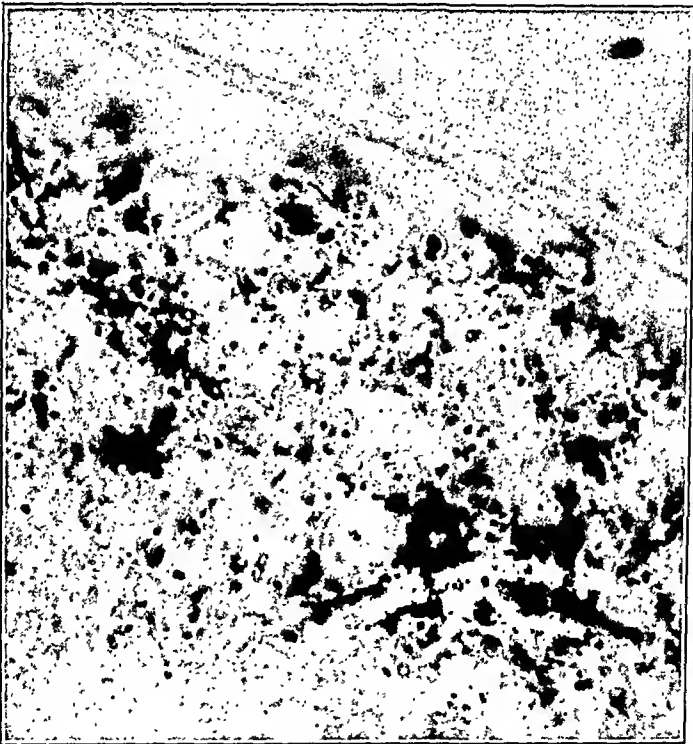


Fig. 18.—Case 5. Oil immersion of similar fields of Fig. 16. Gram stain in tissue. Shows organisms throughout the exudate.

sue was involved. The spread of the infection however in the uterine wall was not marked away from the process in the vein. There were other veins in this region in which the thrombotic processes in the vein had gone on to rather complete organization, but the infected character of the thrombotic process was still apparent from the marked amount of polymorphonuclear leucocytic infiltration. In this region of the uterus streptococci were found in the tissue in great numbers. The cultures both from the cavity of the uterus and from this abscess region showed the same organisms that were recovered at previous uterine culture and from the blood culture. Cultures from the cavity, wall and thrombosed vein gave a gram-positive anaerobic streptococcus as well as the *Streptococcus putridus*, the same organisms which were recovered from the blood.

CASE 5. (Figs. 12 to 19 inclusive.) Patient entered hospital on Nov. 2, 1924, with a history of menses being about two weeks overdue, and of having inserted

douche nozzle into uterine cavity on Oct. 29, 1924. Twelve hours later she had abdominal cramps, with chills and fever. On Oct. 30, 1924, she began to vomit. Diagnosis of incomplete abortion, endometritis (*Streptococcus putridus*), peritonitis. Culdesac puncture on Nov. 4, 1924 with release of 100 c.c. or more of foul-smelling pus which contained same organisms as were recovered from uterus. Note at operation was that there was no "walling off" of the infection. Patient received in-



Fig. 19.—Case 5. Anaerobic streptococci of Schottmüller obtained from the blood stream. Smear from such a culture.

travenous metenochrome and one blood transfusion but died the following morning, Nov. 5, 1924. Patient was dead one week after insertion of nozzle.

*Autopsy Findings.*—Suppurative endometritis of puerperal uterus, parametritis, septic thrombophlebitis, and acute general fibrinopurulent peritonitis, with pelvic peritoneal abscesses. Fibrinopurulent pleurisy, left.

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## RECTAL ETHER ANALGESIA IN LABOR

TECHNIC AND RESULTS IN 5,800 CASES AT THE NEW YORK  
LYING-IN HOSPITAL\*

BY JAMES A. HARRAR, M.D., F.A.C.S., NEW YORK, N. Y.

FOR the past three years at the New York Lying-In Hospital we have been studying and extending the use of the Gwathmey method of rectal ether analgesia in labor. At the present time we are employing it in more than two hundred confinements each month and up to date have used it in 5,800 cases with very satisfactory results. By this we do not claim painless childbirth, but it gives relief to the agonizing part of the ordeal of labor.

The drugs required are morphine sulphate, magnesium sulphate, quinine and ether. One dose of a quarter of a grain of morphine is used hypodermically with 2 c.c. of 50 per cent solution of magnesium sulphate to prolong the action of the morphine. Half of the quantity of ether required for rectal anesthesia is dissolved in oil with 20 grains of quinine alkaloid, and a four-ounce mixture is instilled into the rectum as a retention enema at an interval following the morphine and magnesium sulphate injection. The ether is slowly and regularly absorbed over a period of several hours. The result in 85 per cent of cases was great relief of pain, and more or less relief in 10 per cent more.

Following the technique about to be described, we have seen no ill results to the mother, and the usual disadvantages of other methods of easing pain in childbirth,—perineal delay and asphyxia of the newborn child—are not in evidence. In comparison with the Freiburg “Dämmereschlaf,” experience with which in 100 cases McPherson and I reported to this Society in 1914, we found the effect produced upon the mother’s suffering very similar in typical cases; but with no inhibition of good bearing-down efforts in the second stage, and with no alarms regarding the respiratory condition of the child at birth. It was for these two reasons that we gradually abandoned the typical twilight sleep. Rectal analgesia especially takes the place of intermittent nitrous oxide gas anesthesia during the last few hours of labor. Being simple it can be used in the home without the service of a skilled anesthetist.

We will admit that many labors, especially in multiparae are easy and brief, and there is scarcely need, nor time, for the use of any

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analgesic, but in a majority of labors the suffering of the mother demands relief. With only 4 per cent of negative results and no serious effects on the mother or child we recommend this method for a more extensive use in hospital and home confinements. The details of the standard technic which, though we may adjust it to the individual patient, we have not materially changed in the past two years, are as follows: (I shall quote from my paper read before the Philadelphia County Medical Society, March 11, 1925.)

The treatment should not be started until the woman is in active labor. The pains should be at least at five-minute intervals and lasting at least forty seconds. The length of the contractions are best judged by placing the hand on the abdomen and timing them with the watch, as the outcry of the woman is often a poor index of the

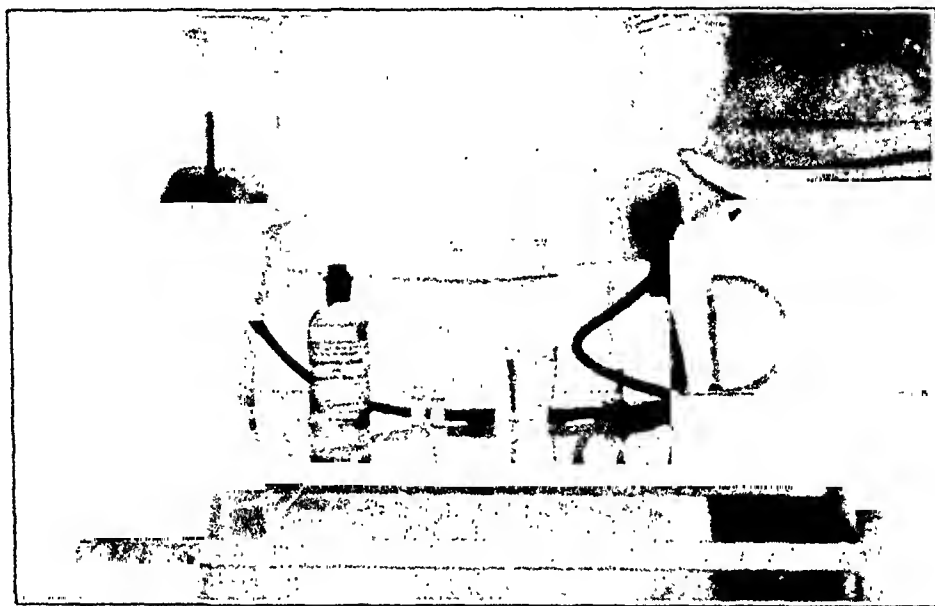


FIG. 1.—Materials for the Gwathmey procedure.

strength of the pain. Waiting for the labor to be well-established thus at once eliminates cases of so-called primary inertia from treatment. In a primipara it is best to wait until the cervix is fairly well effaced and dilated to a diameter of at least two finger tips; in a multipara it can be started before this degree of cervical dilatation is reached, if the pains are of the proper length and interval as described. At this time a cleansing soapsuds enema is given, and this is followed by the primary, intramuscular injection of  $\frac{1}{6}$  or  $\frac{1}{4}$  grain of morphine and 2 c.c. of 50 per cent solution of magnesium sulphate deep into the gluteal region. Judgment must be used as to the soapsuds enema, as it may not be required, if the customary soapsuds enema at the onset of labor has been recently given. The rectum must be both empty and quiescent to retain properly the instillation of ether in oil that is to follow the primary morphine and magnesium sulphate intramuscular injection. Experience has showed that  $\frac{1}{4}$  grain of morphine is usually the proper dose, but in a small woman  $\frac{1}{6}$  grain will be sufficient. Labor should be well under way as previously stated, so that the morphine will not stop the uterine contractions altogether. Tell the patient the object is to relieve her pain, but do not promise her a painless labor.

After this primary intramuscular injection of morphine and magnesium sulphate



the patient is to be kept quiet, oiled cotton is placed in the auditory canal, and the room is darkened. These attentions are reminiscent of the scopolamin amnesia suggestions, but they are of undoubted value in the proper induction of any seminaresis. Twenty minutes after the primary morphine and magnesium sulphate injection we give a second intramuscular injection consisting of 2 c.c. of 50 per cent solution of magnesium sulphate alone. This is given no matter whether the effect of the primary injection is sedative or not, as it tends to prolong the action of the morphine.

We now come to the manner of giving and the time of the rectal instillation. It must not be used too soon. If the effect of the morphine and magnesium sulphate is sedative, withhold the instillation until the effect of the former is almost worn off.



Fig. 2.—Method of instillation.

It is easier to give when the patient is still somewhat under the effect of the morphine; however, three to five minute intervals between uterine contractions should be present. For the beginner it is better to let the morphine and magnesium sulphate wear off entirely and to withhold the instillation until the patient is again complaining and the pains, at three to five minute intervals, are good and strong. If there is no relief from the morphine and magnesium sulphate within one-half hour after the second injection, which consisted of 2 c.c. of 50 per cent magnesium sulphate alone, proceed with the ether instillation. The ether instillation thus rarely should be given within an hour after the first injection of morphine and magnesium sulphate. It may be from one to three hours before it is needed, depending on the patient's distress. The ideal time in a primipara is at about three fingers tips' dilatation of the cervix.

The retention enema which can readily be prepared by any druggist, consists of

Quinine alkaloid -----	gr. xx
Alcohol -----	℥ xl
Ether -----	℥ iiss
Olive oil -----	q. s. ad. ℥ iv

It is given as follows: The contents of the bottle containing the ether mixture and the bottle containing two ounces of plain olive oil are warmed by letting them stand for a few minutes in warm water, first loosening or removing the corks. The patient is then placed on her left side and vaseline is liberally applied around the anus so that the ether mixture if expelled will not irritate. State to the patient, just before beginning the instillation, that its object is to relieve her pain, and thus secure her cooperation. Tell her that during the instillation she is not to press down during pains, but to breathe deeply with her mouth open, and at all times to "draw up" with her sphincter as if she were trying to avoid expelling gas. This will tend to induce reverse peristalsis and permit the fluid to run in more readily.

The apparatus consists of a four ounce funnel attached to a twenty inch length of rubber tubing, which is in turn connected by a glass connecting tip to a red rubber catheter, size 20 or 22 French. A rectal tube is too large.

Pour into the funnel one ounce of warm, plain olive oil. Just as the oil runs out of the catheter pinch the latter near the glass connecting tip with an artery clamp. In this way all the air will be expelled from the tubing. Some of the one ounce of oil should still remain in the funnel. The catheter is now introduced into the rectum for about four inches. If the fetal head is well down in the pelvis, the gloved finger must be inserted into the rectum along with the catheter to insure its passage past the head. A little of the warm ether mixture is added to the oil in the funnel, the clamp released and the contents of the funnel slowly permitted to run into the rectum. The remainder of the ether mixture is gradually added, at no time permitting the funnel to become entirely empty. Just as the last of the ether mixture is about to leave the funnel add the remaining ounce of the warm plain olive oil. Allow this to start running into the rectum and clamp the tube. It is important in order to avoid the expulsive desire that we prevent the entrance of any air bubbles into the rectum. Now make pressure on the anus with a towel during two or three contractions, leaving the pinched catheter in place meanwhile, then gently withdraw the catheter. Should a uterine contraction intervene during the instillation simply make pressure against the anus with a folded towel and let the funnel act as the escape reservoir. Continue to make pressure over the anus during three or four contractions after the catheter is removed. All these details are important and the successful retention of the instillation largely depends on the meticulous care with which it is given.

A third intramuscular injection of 2 c.c. of a 50 per cent solution of magnesium sulphate alone is then given immediately to prolong the action of the ether. The patient may now turn upon her back or assume whatever position is most agreeable to her. The same quiet is maintained as before. Do not make a vaginal or rectal examination too soon after the instillation or the instillation will be expelled. Do not be misled by the quiet behavior of the patient into thinking she is having very slight contractions or none at all. Within fifteen or twenty minutes you can smell ether on her breath, she becomes flushed, and occasionally has a little of the excitability of the first stage of ether anesthesia, but rarely to the extent of requiring restraint.

The patient is drowsy and sleeps lightly between the pains, but consciousness is not entirely lost. She responds somewhat tardily to questions and usually obeys commands as to change in posture. When a uterine contraction occurs she manifests her

suffering to a greater or lesser degree and again dozes. Occasionally the casual observer would have the impression that there was very little amelioration of the pain, the patient complaining and restless during the contractions, and yet afterward we find the amnesia secured to have been as definite as that after scopolamine. Frequently the patient confesses of her own volition that she remembered very little after the rectal instillation was given.

The obstetric side of the case and the progress of labor must be closely watched. Functional abnormalities must be discovered and corrected as they arise, and the mechanism of labor followed and managed as thoroughly as though no analgesia were being employed.

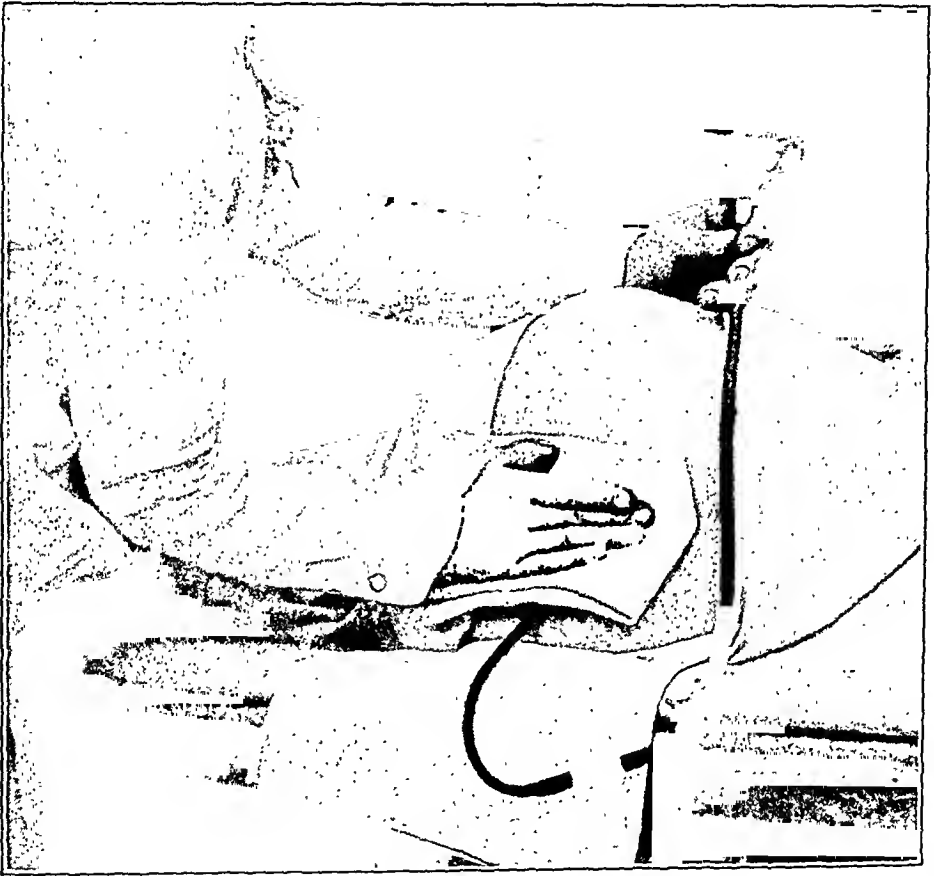


Fig. 3.—Towel pad held over anus after instillation.

When the effect of the first ether instillation has worn off; that is, when the patient again complains of pain, which is usually in from two to three hours, a second, or even a third, rectal instillation may be given at intervals of three hours or more. The first instillation given contains 20 grains of quinine alkaloid; in subsequent instillations only 10 grains are used. Each subsequent instillation is accompanied with one intramuscular injection of 2 c.c. of a 50 per cent magnesium sulphate solution. Contrary to some authorities we are convinced that the quinine is absorbed by the rectum, as evidenced by the occasional complaint of buzzing and ringing in the ears or slight deafness after the labor. We tried 30 cases, omitting the quinine entirely and found the omission of the quinine caused definite second stage and perineal delay. Dr. Losee, of the hospital laboratory, has now definitely proved the rectal absorption of quinine by its qualitative recovery from the urine in 92 out of 100 parturients.

A minimum of inhalation ether is needed for the delivery, and the anesthetist must be cautioned about this. Frequently no additional anesthesia is needed even for a perineorrhaphy. Chloroform should never be used with the ether rectal instillation. Gas, if desired, is safe and very satisfactory as an adjuvant anesthetic for the delivery.

Relief of pain in labor is always open to two serious objections: the prolonging of the labor and the endangering of the safety of the mother or her baby. We believe this method, of all procedures we have so far studied, to be the least likely to prolong the labor if not used too early, and in over 5,800 trials in the past three years to have been without danger to either mother or child. It can be used both in normal labors and in cases of dystocia, in labors induced with hags, in toxemias, in cardiaes, and in women in labor with acute pulmonary conditions to whom inhalation anesthesia might be disastrous. We find that it is applicable in hospital practice in 70 per cent of all labors. This is twice the applicability of scopolamine amnesia in our hospital experience twelve years ago. In other words, there is no obstetric contraindication to the treatment after active labor is initiated. It can be used in the home with equal facility and with equally good results, and does not require the services of a trained anesthetist, especially taking the place of gas anesthesia in the last three hours of labor. The out-patient staff at the hospital are using it with good effect in the tenement confinements. It perhaps does not carry the patient along as thoroughly or as continuously as morphine-scopolamine amnesia, but it gives more relief than any form of inhalation analgesia with which I have had experience. It is not dangerous to the baby, though if pushed to the degree of complete anesthesia, which is not the desired object of the treatment, the baby may be born rather deeply anesthetized. We find no increase in operative deliveries; in fact in some comparative series it seemed proved that the use of forceps was decreased. There has been no increase of postpartum hemorrhage and no increase in the stillbirth rate.

There are certain occasional annoyances—I cannot call them disadvantages—of the method to which I must refer. Most of them are due to faulty technique. The most evident of these is occasional expulsion of the rectal instillation. Close attention to all the details of giving the retention enema will obviate its loss in bulk. The frequent extrusion of small quantities of light yellow, sour smelling, liquid fecal matter, making it more difficult to keep the field clean in the perineal stage, will not occur if the cleansing soap-and-water enema is completely expelled before giving the rectal instillation. In some cases nausea is present, but not as commonly as after inhalation etherization. Patients at times will complain of a slight burning sensation in the anal region immediately after the rectal instillation. The liberal use of vaseline will prevent this, though it sometimes may be due to an unrecognized

fissure. Now and then there is some distention of the colon with gas but not to any serious degree. Rarely the patient has diarrhea during the first twenty-four hours postpartum.

There is never any tender induration after the magnesium sulphate injections such as we see after mercurial injections. To date there have been five abscesses. Two of them occurred when we were using 6 c.c. in bulk of magnesium sulphate solution at one time, and two occurred after giving the injection in the thigh over the fascia lata, a location especially susceptible to abscess after any hypodermic. Considering the thousands of injections we have given, we are satisfied that, given intramuscularly with aseptic technique, the magnesium sulphate solution will not cause any abscess or necrosis per se.

If the primary injection of the morphine and magnesium sulphate is given too early it may temporarily stop the labor, but we have all seen morphine alone do the same thing when we have given it to ease the parturient's suffering while the cervix dilated. If this does occur, when the labor starts again the whole cycle of analgesia is repeated, waiting until the pains recur at at least five-minute intervals and lasting over forty seconds, and the cervix is at least two finger tips dilated before beginning again with the morphine and magnesium sulphate injection. Remember also to be very light with the inhalation ether at the perineal stage, as the patient goes under readily with a minimum amount and the baby may be born deeply anesthetized if much inhalation ether is given the analgesized mother.

Variations in the scheme will occur to physicians who use the rectal analgesia as their experience with it widens. With very large women, or when the ether instillation has no effect or even excites the patient and the birth is anticipated within two hours, a second instillation of one-half the original amount may be given at once. At times in nervous primiparae, or where for some reason we would like to start the analgesia before the pains and the cervical dilatation had attained the desired stage,  $\frac{1}{8}$  grain of morphine can be given with the first 2 c.c. of magnesium sulphate solution, and in one-half hour a second  $\frac{1}{8}$  grain of morphine with the second 2 c.c. of magnesium sulphate, then waiting for the strong pains and three finger tips dilation of the cervix before giving the ether instillation by rectum.

When one has occasion to perform a cesarean section under local anesthesia, an ideal preliminary procedure is to reverse the sequence, giving the rectal-ether instillation an hour before the operation and the hypodermic dose of morphine twenty minutes before. This will place the patient in perfect condition to receive the local novocaine injections, and the analgesia is greatly augmented. Recently we have followed this technique in several cesarean sections under local anesthesia and the absence of suffering on the part of the patient has been noteworthy.

In order to suitably classify our results in the histories we designate as an *A* case, one with perfect analgesia, i.e., where there was almost complete relief of pain and no additional inhalation anesthetic was needed for the delivery; as a *B* case, one where additional inhalation anesthetic was needed for the delivery; as a *C* case, where there was only slight relief of pain; and as a *D* case where there was no relief of pain. With this classification as a criterion the accompanying chart was made out. Fig. 4 lists 5,784 analgesized labors occurring in 1924, 1925, and the first six months of 1926. *A* and *B* cases were combined to produce a curve averaging 85 per cent, *C* cases averaged 10 per cent, and *D* cases averaged 4 per cent.

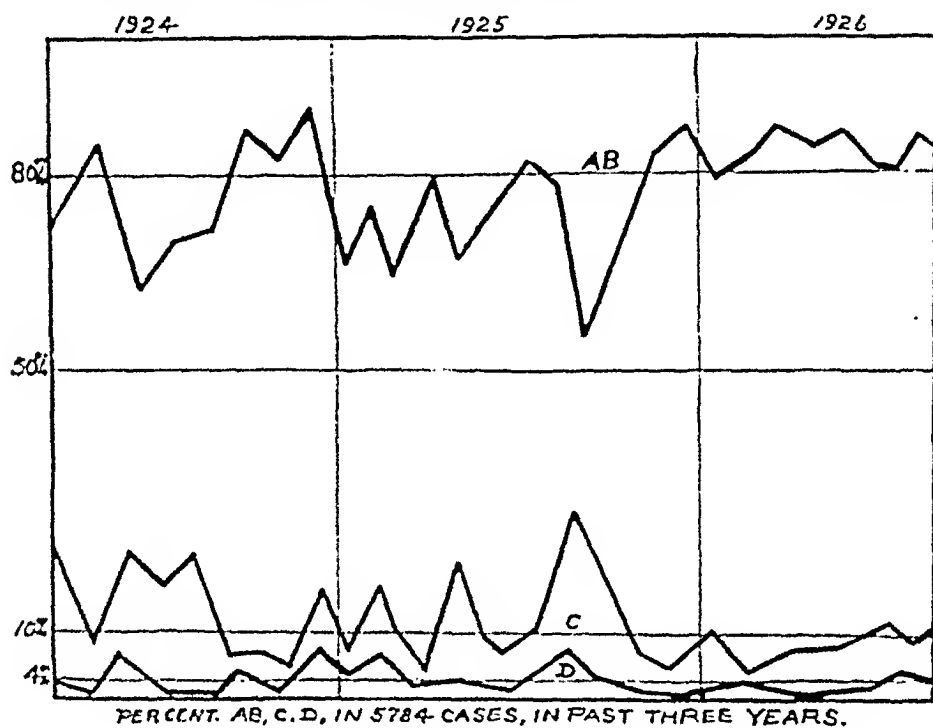


Fig. 4.—Showing classification of results.

#### SUMMARY

Pain is greatly relieved in 85 per cent of cases. In 5,800 analgesized labors we have observed no increase in asphyxia at birth or in the still-birth rate. There is no prolongation of the perineal stage or increase in forceps delivery. The only contraindication to the procedure is uterine inertia and the only restriction is not to start too soon. The woman should be in active labor; that is, pains every four to five minutes, lasting forty seconds by the watch, and in a primipara, preferably the cervix should have attained a dilatation of two or more finger tips. The mechanism of labor must be as closely followed by the obstetrician as if no analgesia were being employed.

The drugs required—morphine, magnesium sulphate, ether, and quinine—are easily obtained and well known in their action. The

quinine is found to be an essential ingredient in the rectal instillation formula. The applicability of the method is much greater than that of scopolamine amnesia. It can be used safely and effectively by the physician in home confinements and does not require the services of a trained anesthetist. We are assured that this is the safest and most effective manner of relief of the pain of childbirth over a period of hours that has yet been devised, and are convinced that it will abolish the most dreadful part of the ordeal of labor without danger to either the mother or her baby.

100 EAST SIXTY-SIXTH STREET.

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### PRENATAL STUDY AND WHAT IT ACCOMPLISHES\*

By THURSTON WELTON, M.D., F.A.C.S., BROOKLYN, NEW YORK

THE successful culmination of an obstetric case depends in the main upon three factors:

1. Intelligent and faithful prenatal care.
2. Skillful and scientific management during labor.
3. Conscientious attention to postnatal hygiene and follow-up.

This chain is no stronger than its weakest link.

The greatest advance made in obstetrics during the past decade is that of antenatal supervision of the expectant mother. This supervision makes of obstetrics a branch of preventive medicine.

Prenatal care will prevent a large amount of ill-health and disability. It reduces maternal mortality and morbidity. It makes for a lowered fetal death rate. It aids in bringing healthy babies into the world. Surely, if this be true, one would imagine that every physician accepting the responsibility of a confinement case would feel it a part of his obstetric conscience to give that patient the full benefits of this first link in the chain of a properly conducted case. However, only a small percentage of the physicians put into practice prenatal care. For all that has been said and written on this subject, only a fraction of the profession really know anything about it.

Unless the physician at large gives proper consideration to this part of obstetrics, various agencies will go over his head and educate the lay public as to what to expect and demand of the physician who contracts to care for the pregnant woman. As an example of this method of educating the public, Dr. Herman Bundesen, Health Commissioner of Chicago, has written a brochure, with clever illustrations, entitled "*Before the Baby Comes.*" This booklet will be distributed far and

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\*Read at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, held in Chicago, Ill., September 20-22, 1926.

wide. Once a woman reads Dr. Bundesen's brochure she will know what to expect and demand of a physician regarding prenatal care.

What does prenatal care cover and in what manner is its application made effective? What is done for the expectant mother at the Long Island College Hospital in its prenatal clinic, can be followed by any physician anywhere. Outside of intricate laboratory tests, the instruments needed are easily procured and inexpensive. The physician should have a stethoscope, a pelvimeter, a reliable blood pressure apparatus, the usual things to make simple urine examinations, a knowledge of the fundamentals of obstetrics and an appreciation of deviations from the normal.

The objects of prenatal examination are as follows:

1. History.
2. General physical examination.
3. Measurement of the pelvis and a diagnosis of possible disproportion between the fetal head and the pelvis.
4. Urine examination.
5. Blood pressure readings.
6. Determination of presentation.
7. Examination for presence or absence of gonorrhea and syphilis, and if present the institution of proper treatment. A routine Wassermann is a good habit.

In the history, tuberculous, cancer, hemophilia, and insanity in the family are looked into. Such diseases of childhood as rickets, scarlet fever, and diphtheria have a possible bearing on the condition of the pelvis, heart, or kidneys.

Operations, especially gynecologic procedures, are of interest.

A knowledge of venereal infection is most important. A thorough review of previous pregnancies—the number, length of gestation, outcome, type of labor, antenatal and postnatal complications, the incidence of infection, the condition of the baby at birth and the subsequent history—all must be studied in a thorough manner.

The patient is asked whether she suffers from headaches, visual abnormalities, pain, nausea, vomiting, vaginal spotting or bleeding, constipation, bladder disturbances, shortness of breath, etc.

The history completed, the patient undergoes a thorough physical examination. The examiner should be alert to discover foci of infection. The teeth, nose, and throat are common sites of pathology. In the neck enlarged glands and thyroid abnormalities are sought. The lungs, especially for the presence of tuberculous involvement, require careful examination. The detection of cardiac disease may prevent a loss in compensation and disaster. An examination of the abdomen, external genitalia, and the extremities, especially the legs for varicosities should be done.



For unknown reasons, the average physician does not attempt to measure the woman's pelvis. We wonder if it is because he thinks it is a complicated procedure calling for the higher specialized skill of the expert. It would be wasting paper and ink to review the measurements of the normal pelvis and consider pelvic abnormalities. We would advise those interested to review this chapter in DeLee's, Polak's, or Williams' textbook, and especially to fix in the mind the normal interspinous, intereristal, external conjugate, and the bisisheial diameters. If the examining finger cannot feel the promintory of the saerum or the posterior half of the brim, it may be coneluded that the internal conjugate is normal.

The physician should keep a lookout for flat and contracted types. It is a good rule to remember that if a head will engage, it will come through, provided a funnel pelvis is not present.

If the bisisheial and posterior-sagittal diameters at the outlet total at least 15 cm., we believe delivery is possible.

In an examination of the urine, he should look for sugar, albumin, aetone, urea, indican, pus, and casts. The total amount passed in twenty-four hours is measured.

In blood pressure readings, we consider a systolie of 130 mm., the upper limit of normal. Beyond this we become concerned and institute appropriate treatment.

The determination of presentation is reserved for the last four weeks of pregnancy. If a breech is discovered, attempts are made to maneuver it into a head presentation. Oeeipitoposterior positions are corrected by posture and binder. A diagnosis of face, brow, or transverse presentation calls for correction.

Beyond advice concerning the hygiene of pregnancy incorporating what exercise may be attempted, the dangers of horseback riding; swimming; the playing of golf and tennis; long automobile rides, etc., one cannot prevent the hemorrhages of pregnancy. However, prompt knowledge of early or impinging symptoms may often save life or long invalidism.

If gonorrhea is present, the signs are accentuated during pregnancy. Syphilis is detected by the history plus symptoms, and positive Wassermanns. If a positive diagnosis of syphilis is made, active treatment at once is the rule. We will show later what prompt treatment will accomplish. It is conceded that the antenatal treatment of syphilis is one of the triumphs of preventive obstetrics.

In the prenatal clinic of the Long Island College Hospital, each patient receives a pamphlet containing instructions as to the hygiene of pregnancy. In language she will understand, among other things, she is informed of the proper care of the mouth and teeth, diet, bathing, rest, clothing, exercise, sexual intercourse, and the care of the bowels. Many excellent books have been written by obstetri-

cians of ability for lay-reading. The physician may suggest that the patient procure one of them. Or, the well-known pamphlet, *Prenatal Care*, which may be obtained from the U. S. Department of Labor, Washington, D. C., (5 cents a copy) will serve splendidly. Many local maternity centers, and Departments of Health in cities and states all have available literature on this subject.

During the first five months, return visits are made monthly, some prefer these visits to be as often as every two weeks. We increase them to biweekly visits during the sixth and seventh months, and weekly during the last two months.

During these visits abnormalities are noted. The blood pressure is taken and the urine examined. In the last month of the pregnancy an abdominal examination is made to determine the presentation, size, and condition of the fetus.

During the first three months, we try to anticipate and prevent abortion and troublesome nausea and vomiting.

From the third to the seventh month, we find syphilis, toxemia, and cardiac disease are responsible for most of the interruptions of pregnancy.

As stated before, once the diagnosis of syphilis is established, active treatment is resorted to. This consists of weekly intravenous injections of arsphenamine and intramuscular injections of mercury for six weeks, followed by six weekly injections of mercury alone. If after this course of treatment the Wassermann reaction is still positive, the course of treatment is repeated.

In making a diagnosis of toxemia, we depend upon the urinalysis findings, blood pressure, weight, and the symptoms of headache, vomiting, edema, and visual abnormalities.

When toxemia is suspected, the patient is seen daily until it is known from which type she is suffering, so that proper treatment may be outlined. We have yet to have any of our patients reach the stage of eclampsia. So rare has become the eclamptic fit that it is the occasional case brought to the hospital by the ambulance that has to serve the student as material for clinical observation and study.

Patients with cardiac disease are warned against exertion; and absolute rest in bed is urged one week out of every four. Proper heart tonics are prescribed. If well compensated, it is our habit to permit the pregnancy to go to term, irrespective of the lesion. During delivery we use morphine and scopolamine. If there is a break in compensation, the aim of treatment is to get sufficient recovery in order to terminate the pregnancy. This is best accomplished, if possible, by cesarean section under local anesthesia.

During the last trimester, we continue to be alert for early symptoms of toxemia and, in addition, we give attention to the prophyl-

laetic care of the breasts, the relief of pressure symptoms, the prevention of premature labor, and the recognition of abnormal presentation and its causes.

Two months prior to the expected confinement, the nipples after cleansing with soap and water, have liquid petrolatum applied to them daily.

Proper abdominal support and the correction of errors in dress will do much in relieving pressure symptoms.

The correction of abnormal presentation has been discussed in previous paragraphs.

We are used to statements that in the United States the maternal mortality is higher than in any other country for which statistics are shown; that, with the exception of tuberculosis, childbirth has the highest mortality among women in the United States, and that approximately 25,000 women give up their lives before, during, and after confinement every year. The problem is a complex and broad one—too involved for discussion at this time, but to be convinced that prenatal care will partly reduce the tragedy of childbirth, one has only to consider a few authentic reports.

In England and Wales (1922) among 2971 deaths from conditions associated with the pregnant state, toxemia caused 556. Concerning this Bourne said, "It is a fair estimate to state that, under efficient antenatal supervision and treatment, as many as four-fifths of the 556 deaths from toxemia might have been saved."

Dr. Campbell states in her report (referring to pregnancy toxemia) that: "The impression is gained from the fatal cases, especially investigated, that there was usually no antenatal care, often because the patient failed to seek advice for obvious symptoms."

In New Orleans (1923-24) the maternal death rate in the Parish of Orleans (no prenatal care) was 1.33 per cent, while in the Outdoor Department of the Touro Infirmary (prenatal care) it was 0.5 per cent.

In the causation of fetal death (survey by Holland and others, published by the Ministry of Health, Great Britain), under "Maternal States," out of a total of 113 fetuses, 42 died because of syphilis and six others because of probable syphilis, while five deaths were due to eclampsia.

Under complications of labor, out of 119 fetuses, 24 deaths were attributable to contracted pelvis; 16 to breech presentation; 10 to transverse presentation, and to brow and face, 4. It is obvious that many of these fetal deaths were unnecessary.

A. C. Beck (from whose reports many statements in this communication have been copied) in an article, *Syphilis in Pregnancy*, tabulated the end-results in a series of 144 syphilitic women cared for during a part of the whole of 166 pregnancies, treated in the Long Island

College Hospital. History and physical examination revealed luetic lesions in only 34 cases. Ninety-five of the 144 women had been pregnant before. Among these 95 women, 74 per cent of the pregnancies resulted in a dead, macerated fetus or a living syphilitic child. Thirty-three went into labor before salvarsan could be given. The result was 9 living syphilitic children, and 16 stillbirths, while 8 of these women gave birth to living children who showed no evidence of syphilis.

At least one course of antisyphilitic treatment was given to 76 women. Of these, 64 went to term and were delivered of apparently normal infants. Of the remaining 12, 6 gave birth to syphilitic children and 6 had stillbirths.

From 1 to 5 injections of salvarsan were given to 57 patients. Of these, 40 gave birth to apparently normal infants, 10 had stillbirths, while 7 were delivered of living syphilitic children.

Eighty-four per cent of the women who received 6 or more injections of salvarsan gave birth to living infants, who have shown no evidence of syphilis.

Occasionally syphilitic women carry all of their pregnancies to term and give birth to living infants. Careful observation shows most of these infants to be syphilitic. Syphilis, therefore, cannot be ruled out when a patient states that all of her children are living and well.

Harrar states that at the New York Lying-In Hospital during a period of six months, in 171 emergency labors, one in every 85 had eclampsia, while in 2,515 regular applicants in the same period, who had more or less prenatal care, only one woman in 420 had eclampsia.

Beck also tabulated 1,000 consecutive cases from the Long Island College Hospital. Of these 106 had contracted pelves. Complications of pregnancy sufficiently grave to influence end-results were observed in 77 cases. Of these, toxemia, syphilis, and cardiac disease were the most common. There were 40 abnormal presentations. Operative interference was required in only 60 cases. In 4,500 consecutive cases, similar to, and including the 1,000, 7 maternal deaths occurred, an incidence of 1 to 643 cases (0.15 per cent). There were 25 infant deaths or 2.5 per cent. These include 6 infants who died at less than fourteen days of age.

While in these 1,000 cases receiving prenatal care, 25 infants died, in 1,000 cases under prenatal nursing supervision there were 47 infant deaths. Contrast these with 1,000 cases with no prenatal care and 76 infant deaths. These figures are eloquent.

This has been offered in an attempt to prove to the physician at large that prenatal care is what Fairbairn terms, "The intelligent branch in the war against mortality and disability in childbed."

Purposely we have omitted many side issues of the subject, such as

maternity centers in cities, the organization of prenatal clinics, and the rôle of visiting nurses in this work.

The responsibility rests on the shoulders of the profession. Janet Campbell states, at the conclusion of her report, "Until antenatal supervision is accepted by patients and their advisers, the invariable duty of the professional attendant engaged for the confinement, we shall never make substantial progress toward the reduction of maternal death and injury. It is the key to success in any scheme of prevention and it must be insisted upon, until it is recognized as a necessary and integral part of the management of every confinement case."

J. O. Polak says that "the public should be taught what can be done by prenatal care and proper and clean obstetrics; for good obstetrics would go far toward removing the horrors of childbirth and the consequent dread of invalidism. Prenatal care is the right of every prospective mother. *Prenatal investigation permits us to discover syphilis, prevents the occurrence of eclampsia, allows the recognition of malpositions, and thus minimizes the difficulties of labor.*"

In obstetrics prenatal supervision is the first step, and, in this, conscientious care is the essence of the contract.

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842 UNION STREET.

# THE CONDUCT OF LABOR AND THE MANAGEMENT OF OBSTETRIC EMERGENCIES\*

AN ANALYSIS OF 6562 CONSECUTIVE CASES OF LABOR CONSERVATIVELY  
MANAGED

BY CHARLES A. GORDON, M.D., F.A.C.S., BROOKLYN, N. Y.

**T**HOUGHFUL study of the problems of maternal and fetal mortality is of tremendous interest and importance. The movement for reduction of infant mortality is steadily growing, yet withal, the baby is receiving more attention than its mother. She is told that frequent visits to her doctor will ensure her safe delivery. Nothing is further from the truth. The accidents and emergencies of labor are, of course, fraught with danger which no amount of prenatal care can do anything to diminish.

It is true that maternal health exerts a great influence over infant mortality, but we know that birth trauma too has a far-reaching effect. That 100,000 babies, not stillbirths, die every year, in this country, in their first month of life is not news. Reduction of these figures may depend as much upon the conduct of the labor as upon the character of the prenatal care.

In maternal mortality much is unavoidable, yet puerperal sepsis, and this is largely preventable, is the chief cause of the mortality. Deaths from other puerperal causes are more or less preventable too. Do not misunderstand me. Trauma, hemorrhage and infection we will always have, but it will take a long time to reach the irreducible minimum, the way we are going, for puerperal mortality has shown no appreciable decrease in many years.

We have long been told that childbed mortality in the United States is among the highest in the world. Many of us have disputed this, yet in considering the trend of maternal mortality in the United States, the Children's Bureau has recently studied deaths from puerperal causes, the accidents and infections of parturition, during a twenty-year period. It appears that deaths from all puerperal causes increased from 13.3 per 100,000 population in 1900 to 16.9 in 1921. However, after making all possible allowances for doubtful factors and errors, it is stated that the mortality from puerperal septicemia has actually decreased, while deaths from all other puerperal causes remain the same. The drop in sepsis is general throughout the world, which is very gratifying. Apparently progress is not being made with the other puerperal causes, accidents and emergencies of obstetric practice.

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It is with this phase of the problem that we are particularly concerned, for responsibility must rest, in some part, upon the attendant at the labor.

If it is true that the mortality of eclampsia and cesarean section has been materially reduced, that vesicovaginal fistula has practically disappeared, that complete tears of the pelvic floor are seldom seen, and mutilating operations upon the fetus rarely done, it is equally true that failure of the average man to recognize disproportion, to watch for the complications of labor, and even to appreciate the extent of descent of the presenting part, is as common as it ever was.

Except for eclampsia, progress is being sought along surgical lines. There are those who say that obstetrics has become a surgical specialty. This is wrong, for the bulk of deliveries will always be done by the average man, who was taught a little in school and learned a lot himself.

Perhaps something is wrong with the teaching of midwifery. Possibly essentials are no longer stressed. Obstetricians are busy inventing operative procedures, looking to shorten or to eliminate the second stage of labor. One induces all women at term, another cuts the perineum of every primipara, while still another sections every eleventh woman and does version on the other nine or ten and, most remarkable of all, another calls all labor pathologic and advocates rapid delivery through a cut pelvic floor as soon as the head is through the cervix; this is followed by manual removal of the placenta. Pituitrin now improves upon the mechanism of the third stage of labor. Cesarean section has grown out of all bounds and is being done for almost every complication of delivery. For the breech, we are advised to do routine rapid extraction as soon as dilatation has become complete. One "views meddlesome midwifery with concern," and then recommends the use of bags to dilate his slow eases, while still another advocates digital dilatation of the cervix in the induction of labor, and so on.

In an effort to measure in some way the value of the work done in two Brooklyn hospitals, where the general principles of conservative obstetrics are still held, we have studied 6,562 consecutive cases of labor occurring in two institutions over a period of five and one-half years. Both hospitals maintain ambulances, but are organized with different types of staff. Hospital "A" has a closed staff. Hospital "B" has a closed staff with a very large courtesy staff. Here we have been as conservative as possible since we felt that our work might influence a large number of general practitioners who were bound merely by an established delivery room technique and the check of the staff conference, which has so functioned that consultation is usually asked in their major problems.

In both hospitals we have tried not to interfere with what seemed to

us would result in spontaneous delivery and have terminated only difficult or prolonged labor.

We are satisfied with rectal examinations, 90 per cent of all the cases having no vaginal examinations at all. Patients frankly progressing have no rectal examination. We are quick, however, to examine vaginally multiparae who fail to progress and primiparae when the head is engaged and no progress is being made.

We believe that primary posterior positions of the head are very common and teach our internes to suspect it always when the fetal dorsum is on the right. We treat these cases expectantly, looking for spontaneous rotation. Only after good dilatation do we do superrotation of the head or occasionally single blade forceps rotation.

Pituitrin is never used by internes and our only indication is inertia in an otherwise normal multipara, fully dilated, and membranes ruptured. By fully dilated we mean that the cervix is retracted over the head. Only small doses are used.

Morphine is freely used only in the first stage of labor with ether for operative procedures and delivery of the head.

Disinfection of the birth canal is not practiced, nor is the cervix routinely inspected for lacerations, nor is any coincident operation done. Lacerations of the perineum are repaired at once.

In our conduct of the third stage of labor, no time limit is placed upon the uterine, but immediately following delivery a tell-tale tape tie is placed loosely upon the cord at the vulva and the usual signs of separation of the placenta awaited. First simple expression, then Credé is tried; these failing, the patient is given more time and manual removal is done only for hemorrhage and for placenta previa when the placenta fails to separate promptly. Less than 7 per cent of all our cases had this operation, mostly in placenta previa.

In Hospital "A" there were 2,154 cases with 33 maternal deaths, or 1.5 per cent; 2,174 babies with 139 fetal deaths; of these 64 died after delivery and 75, including 25 prematures, were stillbirths. All were included, giving a total fetal mortality of 6.4 per cent.

In Hospital "B" there were 4,408 cases with 36 maternal deaths or 0.8 per cent, and 4,460 babies, of which 84 died after delivery, and 142 prematures, of which 76 died, and 233 stillbirths. All (393) were included, giving a rate of 8.8 per cent.

These figures have been analyzed from the standpoint of incidence of the commoner obstetric emergencies and operations in the two types of hospital, "A" and "B."

We have been slow to extend the indications for cesarean section, and no patient has been induced before term for disproportion. In this series there were 80 sections with four deaths, 23 in Hospital "A" with two deaths and 57 in Hospital "B" with two deaths, an incidence of 1.2 per cent with 5 per cent mortality. The deaths were due to



eclampsia in two cases, acute gastric dilatation in a case of mitral stenosis, and sepsis. Six low sections are included.

Weighing the risk of elective section against rupture of the uterine scar, with its disastrous consequences for both patients, we section again all those who have been sectioned before, at term if possible, or in labor, unless labor has progressed to a point where it may be quickly terminated by forceps or spontaneous delivery. Ten patients were sectioned for this reason.

Nine patients were sectioned for placenta previa. The others were managed by simple rupture of the membranes, or a Voorhees bag until dilatation was complete enough for version, which was then followed by spontaneous delivery or manual aid and delayed extraction.

Here the fetal mortality will always be high on account of prematurity. Only one-third of our patients were near term. We believe that until the maternal risk of section is reduced to that for other methods of delivery, section is not justified except in a small class of cases. So far we have done it only for the primipara in good condition with a poorly dilated cervix and a child near term. We are not ready, however, to expose a term baby to the dangers of placental separation and version, even in a multipara where there has been but little bleeding, if we feel that version will probably result in the baby's death.

In all we have had 99 cases, 29 in Hospital "A" with two deaths, an incidence of 1.3 per cent with mortality 6.9 per cent, and 70 cases at Hospital "B" with ten deaths, an incidence of 1.5 per cent with a mortality of 14.3 per cent. The total mortality was 12.4 per cent.

In eclampsia we feel that there is no doubt that delivery is a distinct advantage, yet only rarely can it be effected without increasing the risk. Although six patients in this series had cesarean section, we class abdominal delivery, except for an occasional preeclamptic at term, with all other forms of accouchement forcè, and believe that manual dilatation, difficult forceps and cervical incisions have no place in the treatment of this disease. As in placenta previa, the fetal mortality must necessarily be high under any method of treatment. All other cases have been treated with the utmost conservatism, morphine, chloral and protection from external stimuli and meddlesome investigation and treatment. We have abandoned sweating, colonic irrigations, spinal and intravenous medication and are about to drop venesection.

At Hospital "A" we saw 23 cases of eclampsia with eight deaths, an incidence of 1.1 per cent with a mortality of 34.8 per cent. In Hospital "B" there were 65 cases with ten deaths, an incidence of 1.5 per cent, with a mortality of 15.4 per cent. The total mortality was 20 per cent. All had convulsions.

Version was done 42 times in Hospital "A," 1.9 per cent and 110

times in Hospital "B," 25 per cent. Craniotomy nine times in both institutions, only on the dead fetus.

The use of forceps furnishes the most interesting figure for comparison between the two types of work. Hospital "A" had 76 forceps deliveries, an incidence of 3.5 per cent, Hospital "B" had 511 forceps deliveries or 11.6 per cent.

Perineotomy was done ten times in Hospital "A," and 106 times in Hospital "B," all on primiparae.

Summarizing briefly, it is not my intention to draw any conclusions or to suggest any comparisons. The series is small. There is nothing to be gained. These figures are merely shown as representing the work of a large number of men practicing obstetrics in a hospital where there is a department of obstetrics and a courtesy staff, as compared with the work of another hospital where all the obstetrics is managed by the staff itself. They vary but little except for the incidence of forceps and a rise in fetal mortality which is in part accounted for by a large number of stillbirths which need further analysis.

I believe there is a rapidly widening gap between the specialist, on the one hand, daily improving his skill, conducting clinical research, publishing much, and the average man, who, when all is said and done, handles the bulk of obstetrics.

The average man has always meant well. His heart is right. Often he tries hard; he reads his journals and listens to papers, which all too often deal with major phases of obstetrics with which he is but little concerned. He needs fundamentals, as does the undergraduate student.

Hospitals might well open their doors for the practice of obstetrics to all those near them who will agree to follow the rules for technique, consultations, and operative deliveries and report their difficulties and casualties at the staff conference. Do not underestimate the value of that. The staff conference is the greatest single factor in the organization of the hospital for the protection of the patient and the education of the staff.

There is a problem. Apparently there is a crying need for improvement. We must take cognizance of it. The responsibility is ours. Just as the medical school accepts responsibility for the training of men to practice medicine, so is the medical profession itself bound to see that those within its ranks are qualified.

National societies like this, local special societies, and organized medicine in the state and county medical societies must take up the burden. Only then will we make progress. The answer will be found, not in the training of more specialists, we never could train enough, but in the continuous education of the average man. That means graduate education, not by providing courses for those who

seek them, but by the organization of hospitals everywhere, making available for all the vast amount of clinical material which passes through their wards, and carrying to all, clinical opportunities for review of their own experiences, which are now denied them. Hospitals will then arrive at their full measure of usefulness, and the medical profession discharge its obligations to the public and each other. Let us do it.

256 JEFFERSON AVENUE.

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## VAGINAL HYSTERECTOMY AND ITS INDICATIONS\*

BY J. W. KENNEDY, M.D., PHILADELPHIA, PA.

I WOULD be very happy indeed if I could present this subject to our association as it was taught me by probably its greatest advocate and master, the late Joseph Price, who was one of the founders of this association and a former president.

I take it for granted that we are just as remiss in not well practicing what we know by making use of our medical and surgical privileges, as we would be to grow indifferent and lacking in the habits of industry in the pursuit of scientific innovations of the future.

Disparity between privileged results of surgery of the acute abdominal conditions, surgery of the uterus and of the breast, and our everyday results, is so significant that we cry out for better control of these lesions.

Reviewing our results for the past twenty years in the Joseph Price Hospital, we are able to say with as accurate statement as it is possible to make with such review, contrasting our privileged results with those existing, that we are utilizing only about 5 per cent of our surgical privileges in the major urgent conditions. In other words, 95 per cent of our fatalities were due to human errors, possibly such had better be called personal or individual errors, as they are not the shortcomings of scientific attainments.

In spite of such organizations as the great American Medical Association, the American Congress of Surgeons, and associations such as ours which have even transcended in accomplishments the most sanguine expectations, yet we remain a crippled profession as far as our execution goes, even though our scientific privileges are magnificent. We are not in possession of the people. We have not been able to educate them as to our real worth of service. However, I feel that the more recent organization of the Gorgas Memorial Institute of tropical and preventive medicine by Dr. Franklin Martin, is a very

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strong bridge over which we may carry the knowledge of the privileges of our advanced thought and work. Occasion and space do not permit me to go into the workings of this great Gorgas movement, so I can only add that this organization by taking in lay members and through talks by its medical members to lay associations, and further, by the publication of short articles understandable by the masses, such articles being published in the lay press, we have the most forceful method, in my belief, of bringing before our people the great life-saving service of which our profession is capable.

I have given this preliminary discussion because I know of no subject or condition where privileged results are so outraged as those of the offending uteruses.

I am forced to speak of vaginal hysterectomy as the method for removing the uterus, as I find that over 90 per cent of the uteri which have been removed during my association with the Joseph Price Hospital, have been extirpated as a vaginal hysterectomy.

In spite of this large percentage of vaginal hysterectomies as compared with the suprapubic route, were it not for the clamps, I would not do vaginal hysterectomy.

#### ADVANTAGES OF THE CLAMP METHOD

The clamps have increased the operability of the procedure by at least 50 per cent. The clamp is the very best method of controlling hemorrhage. The operation may be done very much more quickly with the clamps, as remote vessels may be easily secured.

The ties being very insecure by the ligature method, I believe, is one of the reasons the operation has never become popular.

In removing the uterus when in proedentia, the clamps have a most important function, as their rigidity holds the vaginal fornix at a high level and does much to correct the cystocele and rectocele. The clamps have a very important function from the standpoint of drainage.

#### MORTALITY OF VAGINAL HYSTERECTOMY

In comparing the mortality of vaginal hysterectomy with the suprapubic method of removing the uterus in the Price Hospital, we are compelled to endorse the lower route of removing the uterus. Although there have been no deaths from the suprapubic method from either operative or postoperative hemorrhage or from operative infection, during the period that the suprapubic and the vaginal operations were compared, yet the mortality was fifteen to one in favor of the vaginal route.

#### INDICATIONS

The indications are fibroid tumors which may be delivered by the vaginal route, practically all malignant conditions of the uterus other than the possible malignant degeneration of the large fibroid tumor,

prolapsed of the uterus and marked prolapse of the heavy organ where pregnancy is not to be considered, the offending uterus of the large fleshy woman, a condition of the cervix which I choose to call the abused cervix, and the bleeding uterus which has resisted conservative treatment.

#### FIBROID TUMORS

A comparison of the mortality between the suprapubic method and the vaginal route of removing the fibroid uterus has conspicuously shown the real tragedies of suprapubic hysterectomy.

On account of the sudden deaths which follow several weeks after a perfect convalescence from a suprapubic removal of a fibroid tumor, I have felt for a number of years that the fibroid tumor which has existed for a good length of time evidently produces a toxemia which causes a tissue degeneration. We know the abdominal walls of a fibroid patient grow thick—such tissue is most probably a form of degeneration—and a like condition is evidently taking place in the myocardium and thus accounts for some of the sudden deaths.

For a number of years we thought these sudden deaths were due to embolus or thrombus, but in more recent years I feel many of these sudden deaths following removal of the fibroid tumor of the uterus are due to a diseased myocardium. I have never seen such sudden death follow vaginal hysterectomy.

As the operative time of vaginal hysterectomy is about one-tenth that of the suprapubic method, operative shock is practically never seen. I have seen but one instance in several thousand operations. I have never seen postoperative pneumonia follow the vaginal operation. As vaginal hysterectomy is practically an outside procedure, all of the units of operative depression and trauma are reduced to the minimum.

If one cares to resort to morcellation, there is scarcely a limit to the size of a fibroid tumor which may be removed from below.

#### MALIGNANCY OF THE UTERUS

Other than the malignant degeneration of the large fibroid tumor of the uterus, all malignant conditions of the uterus are met by vaginal hysterectomy.

It must be remembered that probably 90 per cent of uterine malignancy occurs in the cervix, so that the big end of the malignant cone is at the cervical location and most accessible to vaginal work.

The clamp method of vaginal hysterectomy not only greatly enlarges the percentage of operability but also much increases the amount of tissue which may be removed.

Much of the vaginal fornix may be removed with ease by the clamp method, which would be quite impossible by the ligature method of operation.

It must be kept in mind that all the tissue which is within the clasp of the clamp sloughs away, so that the operation is more extensive in tissue removed than would appear.

Many malignant cases much too late for ligature operation from below are still easily managed by the clamp method. We are constantly operating upon patients for malignancy of the uterus from six months to a year after they have been refused by good operators who do not use the clamp method for hysterectomy. We much regret the fact that these patients are too often turned over to the x-ray operator when they are still good risks for a permanent cure by the vaginal hysterectomy clamp method.

Before we begin to do the vaginal hysterectomy, we most thoroughly cauterize the cervix, which not only prevents malignant operative implantation but also cleans up the field of operation.

It is my opinion that the vaginal hysterectomy clamp method is our solution at this hour for malignancy of the uterus; the only missing link is early diagnosis.

We must teach the student not to dismiss the possibilities of malignancy of the uterus simply because the cervix seems uninvolved. He must be taught the three zones of uterine malignancy, namely, the cervix, the fundus, and the middle portion of the organ near the location of the internal os. The student should also be made familiar with the relative dangers of such locations of malignancy and also the relative frequency of each, etc.

#### PROCIDENTIA

Procidentias are clear cut indications for vaginal hysterectomy and yet several recent graduates from our big universities have informed me that they had not seen a vaginal hysterectomy.

The clamp method for removing the uterus in procidentia has a most important function in correcting much of the rectocele and cystocele. I know of no more miserable condition than the patient with a completely prolapsed uterus with big, painful ulcerating areas. Many of these patients are told nothing can be done, whereas, removal of the organ by the clamp method, which may be followed by repair of the cystocele and rectocele, has given the most brilliant results of my experience.

#### THE ABUSED CERVIX

We are often confronted with a pathologic condition of the cervix which I choose to call the abused cervix. The cervix is very large, even larger than the fundus of the uterus; it has been badly lacerated; its lips are everted and hypertrophied and covered by large eroded areas of granulating tissue. The entire surface may be studded with nabothian cysts, very tender to the touch and adding materially to the size

of the organ, and there may be beginning malignancy. So the cervix has been abused from the standpoint of laceration or injury, and abused from the standpoint of pathologic growth.

Many of these patients with such a cervix are nervous wrecks and fit subjects for the asylum. I have seen such a patient pass into a paroxysm from the mere touch of the cervix. Certainly vaginal hysterectomy is here indicated, as the organ is beyond repair or salvation.

#### THE BLEEDING UTERUS

We occasionally see a small uterus with no evidence of tumor, which has resisted all conservative means of treatment. Such organ may have to be removed. We often refer to such condition as a fibrosis of the uterus, although there is in reality no fibroid tumor—indeed the organ is often small. Such conditions can best be met by a vaginal hysterectomy.

I have felt for a number of years that in the case of a patient forty years of age or older, the uterus with a polypus protruding from the cervix should be removed, for the reason that very often the fundus of such an organ may contain one or more polypi and malignancy may always be lurking near.

#### HYSTERECTOMY IN THE FLESHY WOMAN

For the patient forty-five years old or older, who weighs from 180 to 250 pounds (and there are many of them), who is carrying an offending uterus, I feel vaginal hysterectomy is by all odds indicated. These cases are poor subjects for any kind of surgery, their hearts are participating in the fatty degeneration, and their deaths are often the acute tragedies seen by all of us.

Their size does not interfere with the vaginal route; the quick operation and the absence of all elements which contribute to shock and postoperative pneumonia are overwhelmingly in favor of the vaginal hysterectomy clamp method.

Vaginal hysterectomy has been considered a difficult operation. I am sure any operator with ordinary ability can master every detail of the procedure if he will adopt the clamp method of doing the operation and observe one or two technical points in the hysterectomy.

The method used in the Joseph Price Hospital differs from popular teaching in a number of essential features which I believe have made the procedure much more simple, safe, and manageable. Space does not permit me to go into the technical operative steps; such has been illustrated in full in a monograph entitled, *Practical Surgery of the Joseph Price Hospital*.

I have not gone into the relative merits of thoroughness of the vaginal

hysterectomy clamp method as compared with the very radical suprapubic method as advocated by Wertheim.

Some years ago I made a study of the radical suprapubic method of removing the uterus, and I found in examining the specimen removed, after the operation, that my most radical attempt in removal of the uterus and the perinterine structures had often consisted in more of a dissection than the real extent of tissue removed; and further, that a great amount of tissue which I supposed had been removed, remained in the pelvis in the perinterine area.

With the exception of removal of the abdominal glands, I believe that the vaginal hysterectomy clamp method is as radical an operative procedure from the standpoint of potential malignant tissues removed, as it is possible to do.

If we compare the number of patients who die from extension of uterine malignancy through continuity of structure, with those who are lost from involvement of the abdominal glands, much light is thrown on the subject.

Most operators have found the primary mortality of the Wertheim procedure prohibitive, etc.

I will conclude by saying that vaginal hysterectomy has the broadest field of usefulness, the lowest operative mortality, and the best postoperative history of any major operation to my knowledge.

241 NORTH EIGHTEENTH STREET.



# THE TRANSVERSE EXCISION OF THE FUNDUS UTERI WITH OVARIAN CONSERVATION\*

BY PROF. OSCAR BEUTTNER, M.D., GENEVA, SWITZERLAND  
(Honorary Fellow)

IN 1908, I published my method of transverse cuneiform excision of the fundus uteri with conservation of healthy ovarian tissues and the extirpation of both chronically diseased tubes. This publication which appeared in the *Centralblatt fuer Gynaecologie* was followed in 1909 by one in the French language and in 1910 by a third in the English language, in *The Journal of Obstetrics and Gynecology of the British Empire*, September, 1910.

In August, 1913, I read a paper on the occasion of the Seventeenth International Congress of Medicine, in London, on the transverse cuneiform excision of the fundus uteri as the first stage in the extirpation of bilateral chronically diseased appendages, with conservation of the menstrual functions. I then described my method as follows:

After opening the abdomen, the appendages of the uterus have to be closely examined, paying special attention as to whether comparatively healthy ovarian tissues are obtainable; if this is the case, and the patient is comparatively young the transverse fundamental incision of the uterus is proceeded with. That is to say, first of all, the two edges of the uterus are stitched round, as deep down as possible, with strong catgut to reduce the hemorrhage.

Next, the anterior and posterior walls of the uterus are caught in the middle line, two inches below the fundus, with a fine forceps and the uterus is raised. Then follows a transverse incision, first in the front and then in the back of the uterus, forming a cuneiform mass of the fundus. This cut must be modified according to whether it be desirable or possible to spare in front the insertion of the round ligaments and in the back the insertion of the ligaments of the ovaries. The cuneiform cut must not be split in the middle line and both halves are freed up to the broad ligaments. The wound, which must reach as far as the cavity of the uterus, must be immediately closed.

Then the diseased appendages have to be set free from the inner to the outer side, and from below upwards; in so doing it is absolutely essential to preserve some of the comparatively healthy ovarian tissues.

In some cases the two ovaries may be entirely spared, at other times they must be partially cut away; again in other cases one of the ovaries must be excised and the other can be partially conserved. Closing both wounds in the broad ligaments, the anterior parietal peritoneum is fixed on the posterior and upper wall of the uterus with catgut, near the seromuscular seam, continuously from right to left, in order to further solidify the termination of the wound which has been made in the uterine fundus. This seam holds up the uterus in mobile ante flexion.

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\*Read at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, held in Chicago, Ill., September 20-22, 1926.

Up to the present date I have performed eighty such operations, the ultimate results as regards pain and anomalies of menstruation, being excellent.

Dr. Schmid, of the Prague Clinic, has published 120 cases treated by my operation and Professor Wagner, of the same clinic, has recently very strongly recommended the transverse cuneiform excision. The latter concludes his article in the *Biologic und Pathologic des Weibes* (published by Halban and Seitz), with a reference to this excision, which is not sufficiently appreciated by German gynecologists.

In the same work Professor Heynemann, of Hamburg, also refers to my operation. He considers it an enrichment of our operative methods and proposes to use it in the cases in which it is indicated.

Dr. Mansfeld, of Budapest, has informed me that he has performed several such operations, and has lost only one patient. The cases will shortly be published in detail. Professor Lécane, of Paris, who has published twenty-one cases and has called my method "hysterectomie fundigue," considers that this simple method of conservative hysterectomy, which in 76 per cent of all cases allows of the hope of conserving the menstrual functions, deserves wider knowledge and use among surgeons.

Professor Bell, of Liverpool, who calls my operation the "Bell-Benttner" operation, made his first application of the conservative principle in 1913; and in *Surgery, Gynecology, and Obstetrics* for January of this year he presents a record of 127 cases with only 2.3 per cent mortality. He says: "Although in the United States the operation has been called the Bell-Benttner operation, it should be understood that in this designation the similarity of principle rather than that of technical detail is implied. Moreover, although I was unaware of the fact, and devised the operation quite independently, there is no doubt that Professor Benttner's past communication preceded mine."

There is no doubt that my American colleagues are well aware of the true position of the question, for I have read with much pleasure the following passage by Gellhorn in the *Transactions of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons*, 1921, xxxiv, 158:

"To reduce this dreary train of operations (the persistence of the inflammation in the interstitial positions of the tubes) Benttner, of Switzerland, devised an operation which was sponsored by Polak in this country and revived by Bell in England, and consisted of the removal of both adnexa and a part of the uterus."

Finally, it should be noted that of course every surgeon operating on my principle has developed his own technic.

My recommendation always to perform a hemisection of the cuneiform cut of the fundus uteri has not been accepted. But as hitherto

I have used my method only in very serious cases, I have considered that the hemisection would greatly facilitate the operation. I have further come to the opinion, previously also held by Schmid, that in less serious cases bilateral salpingectomy could be abandoned in favor of transverse euneiform excision of the fundus uteri. Of course in such cases the hemisection is not necessary and the appendages of the uterus can be extirpated from left to right or conversely, according to the American method of Kelly.

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## THE BIOLOGIC DEFENSE IN PUERPERAL INFECTION\*

By PALMER FINDLEY, M.D., F.R.C.S., OMAHA, NEBRASKA

AN UNTOLD amount of work has been done on the biologic problems related to puerperal infection, but as yet we know little of the susceptibility to infection and the powers of resistance. When we speak of body resistance and of tissue reaction to infection we speak in generalities and with little knowledge of the factors concerned. The clinician observes two cases in which the bacteriologic conditions are apparently identical, yet one escapes with a mild degree of infection, the other dies. Again he observes a grave case of sepsis in which there were no evident predisposing causes to account for the infection. All this suggests our limitations in determining the mechanism of defense in any given case. It is one thing to identify the microorganisms, to recognize the atria of infection, to account for predisposing factors, and to note the avenues by which the infection spreads through the tissues of the body; but it is quite another thing to judge of the forces of defense, much less to reinforce the defense in any definite scientific manner.

In this connection the London Report on *Puerperal Sepsis* is significant. In this report was an analysis of 247 cases of which 160 recovered and 87 died. In the first group of 160 cases 26 per cent were delivered spontaneously and without laceration or venereal discharge. The source of infection could not be revealed. The remaining 74 per cent of cases were delivered by forceps or version and lacerations resulted. In the second group of 87 cases which resulted fatally labor was spontaneous and without lacerations or known causal factors in 22 per cent, while in 78 per cent labor was prolonged, requiring forceps or version and with injuries to the soft parts. It will be observed that the percentages do not differ materially in these two groups. It is apparent that some unknown factor

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\*Read at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, held in Chicago, Ill., September 20-22, 1926.

or group of factors was responsible for the results recorded; and we ask why recovery in the first group and death in the second group? The answer probably lies in the difference in the defensive mechanism.

A consideration of the forces at work in combating infection involves the whole subject of immunity, a task I would not presume to engage. The recent work of J. Hofbauer, of Johns Hopkins, on the cellular defense in the parametrium is of very great significance and well worthy of further investigation. Metchnikoff laid the foundation for all that is known of cellular defense in infection. Applying his observations on phagocytosis to the infected uterus we have long known of a cellular defense in the decidua; a so-called granulation zone composed of leucocytes. Here the polynuclear leucocytes greatly outnumber the mononuclear cells in the acute stage of the infection, the mononuclear leucocytes coming more in evidence in the later stages of the infection. Metchnikoff early pointed out that the polynuclear cells ingested living bacteria while the mononuclear cells ingest cell detritus and to a more limited degree the bacteria. It is further observed that the mononuclear cells seem to arise from fixed tissues of mesoblastic origin. It would appear that they serve the purpose of removing cellular exudates of long standing as contrasted with the polynuclear cells which are largely engaged in the destruction of bacteria in the early stages of infection. In event of failure of the leucocytic barrier to withhold the attacking microorganisms, the myometrium becomes increasingly beset with leucocytes as the bacteria invade the wall of the uterus.

All this has long been known but it remained for Hofbauer to demonstrate specific types of cells in the cervix, in the lower uterine segment, and more particularly in the parametrium at the base of the broad ligaments. That leucocytes are not the only phagocytes in the body is conceded by all immunologists. Kolmer says that, "besides leucocytes, some of the tissue cells which are free, or have the power of becoming so, are actively phagocytic." He furthermore says that endothelial cells of the lymph spaces and serous cavities are especially active, not only in the phagocytosis of other cells and cellular debris but also of various bacteria; that in exceptional instances epithelial cells may act in the capacity of phagocytes. Wells adds that "there is also evidence that the fixed tissue cells of the reticuloendothelial system, which are universally distributed, are especially active in the production of antibodies," and that "not only leucocytes but tissue cells are capable of phagocytosis when properly stimulated, and apparently all or nearly all fixed cells may act as phagocytes under some conditions. Reticuloendothelial cells are particularly active in phagocytosis as also are the new mesodermal cells produced by inflammation. Apparently they obey the same laws as leucocytes and not only

take up bacteria but also fragments of cells and tissues, red blood corpuscles and even intact leucocytes and other tissues."

This extended recognition of the phagocytic power of cell types brings us to a ready understanding of the work of Hofbauer. In addition to the phagocytic leucocytes which abound in the parametrium in the presence of invading microorganisms Hofbauer has demonstrated the presence of specific cell types which he classifies as monocytes and clasmatoocytes. These he has found in limited numbers as early as the third month of normal pregnancy and has observed their increase in number as pregnancy advances. In event of prolonged labor and of infection following labor the increase in the cell elements was very great.

In the nonpregnant woman the parametrium is made up of dense fibrillar connective tissue, a few muscle bundles and a very limited number of cell elements. In event of pregnancy the cell elements increase rapidly in numbers and arrange themselves along the course of the lymphatics which accompany the blood vessels. These cells are believed to originate from small oval cells grouped about small blood vessels and are probably identical to the adventitial cells of Marchand. The transition from the small oval cells in the neighborhood of small blood vessels to monocytes and clasmatoocytes can be clearly traced. The monocytes are fairly uniform in size, kidney-shaped or rounded in outline with ragged margins; the nucleus is round and large in comparison with the cytoplasm. The clasmatoocytes are larger than the monocytes and are found in greater numbers. Their oval nucleus occupies an eccentric position. These cells vary greatly in size and form. The cytoplasm exceeds that of the monocytes and within the cytoplasm are vacuoles and in the vacuoles and cytoplasm may be seen blood pigment and cell debris. Both monocytes and clasmatoocytes take the neutral red stains. It is therefore clearly demonstrated that these cells (monocytes and clasmatoocytes) are phagocytes. In advanced pregnancy and particularly in event of infection the parametrium abounds in them.

In addition to the above cell types Hofbauer describes lymphoid bodies beneath the endothelium of the lymph spaces of the parametrium. These he regards as primitive lymph nodes and credits them with phagocytic qualities. That these cell structures play an important rôle in combating infection is demonstrated by the experiments of Portis, who found that the clasmatoocytes of the omentum showed increased activity after intraperitoneal injections of antigen; while Gay and Morrison observed that animals in which exudates were made rich in polynuclear leucocytes by the injection of such substances as alcuronat were no more resistant than normal animals, but where there was present an abundance of histiocytes in the exudate the animal could withstand many multiples of the fatal dose of

streptococci. The observations of Gay and Morrison led them to conclude that histiocytes are in great measure, if not entirely, responsible for the local defense against streptococcic infection. Nakahara injected the peritoneal cavity of mice with olive oil and found that the resistance to infection other than streptococci is increased by provoking a macrophage reaction.

It has been demonstrated experimentally that resistance to bacterial infection is coincident with marked reaction of macrophages. Metchnikoff demonstrated the important fact that phagocytosis is uniformly more active where the infected animal recovers. In animals which show a natural resistance against any given microorganism, phagocytosis is correspondingly more energetic than in animals which show a susceptibility to the same infective organism.

I am not concerned with the controversy between the humeral and the cellular theories of defense because, in the words of Karsner and Ecker, "The two theories of immunity are in perfect harmony with one another and it is known that they are dependently interrelated."

If we are to accept the hypothesis that these phagocytic cells are potent factors in defense of infection, the question arises as to the nature of the stimulant giving rise to them. Are foreign proteins the cause? Hofbauer doubts this because the maximum activity of chorionic deportation through the blood stream is in the early months of pregnancy, whereas the cellular reaction in the parametrium is at its height at the end of pregnancy. He believes it to be conceivable, however, that "the hormones or whatever substance which produces the well-known changes in various organs of the pregnant woman causes the parametrial phenomena." The invasion by bacteria of the parametrium unquestionably supplies the impetus for the added increase which is seen to such a marked degree in event of infection.

In a personal communication Hofbauer writes that he is now experimenting with chemicals in the effort to find an artificial means of stimulating the parametrial tissue in the hope of augmenting the development of phagocytes. And we ask, is it not possible that such antiseptics as mercurochrome and silver nitrate combat infection not alone by their direct destruction of bacteria, but by stimulating the development of phagocytes?

# A CONTRIBUTION TO THE PHYSICAL THERAPY OF UTERINE AFFECTIONS\*

BY JOSEPH RIVIERE, Sc.D., M.D., PARIS, FRANCE

THE recognized harmlessness of well-managed physieal therapy joined to the usual efficaciousness of its proecesses, has assured the progressive development of the method for the treatment of certain gyneco-logic affections. The most beneficent results are obtained chiefly by high-frequency, diathermy, actinothrapy, intrauterine ionization, and roentgenization. It is often of advantage to associate these various procedures in order to obtain the best results: the regularity of regional eirculation, the regeneration of the smooth fibers, the resolution of the edemas, eongestions and indurations, antisepsis against uterine infection, equilibration of the involution of the matrix, and reconstitution of the pelvie parenchyma.

Physiotherapy may reestablish the vitality of the organs which preceeds those conditions of chronie inflammation and selerosis.

Two syndromes often complicate the gynecoologic ease,—neurasthenia and gastrointestinal atony. The static bath, high-frequency effluve, and the ultra-violet rays in the former; diathermy and actinothrapy in the latter, will improve these nervous disorders, but especially when the liver is activated by means of such a drug as calomel, which I prefer, and the other emunctory organs are constantly functioning. It is thus that we generally bring about an improvement in neuropathic subjects with pelvie pains; the irritation of the uterus diminishes as well as ovarian hyperesthesia and the lumboabdominal neuralgia.

Physieal therapy should not limit its eurative effects to the local conditions. What it ought chiefly to aim at is the modification of the dyserasie predisposition. Since my inaugural thesis (*Nervisme-Neurarchie*), Paris (1884), I have always considered that the physieal agent affects the centripetal peripherie nerves, whose exeitation is conveyed to the neurons of the diseased region. Such is the genesis of action of physical therapy.

Dysmenorrhea, whether spasmodie, eongestive, inflammatory, or even membranous, is often amenable to physieal therapy. The static bath and general d'arsonvalization, combined with localized galvano-

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\*Read by invitation at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynécologists and Abdominal Surgeons, held in Chicago, Ill., September 20-22, 1926.

faradization, ameliorate the most rebellious menstrual pains. I have found that this treatment overcomes amenorrhea. At the Congress of St. Petersburg, 1901, I stated that the application of the ultra-violet rays to the abdomen regulates the catamenial flow and lessens ovarian neuralgia.

For more than a quarter of a century, I have used daily the intra-uterine ionization treatment and the three forms of high-frequency (effluvation, scintillation and diathermy) for cervical and endocervical metritis. Short and repeated applications, without pain and in exact dosage, are preferable in my experience to chemical caustics.

In the treatment of vegetative or catarrhal ovaritis and salpingitis, hydro- and pyosalpinx of blennorrhagic or tuberculous origin, not calling for immediate surgery, we are dependent largely on diathermy and the intrauterine ionization. For the improvement of inflammation of the adnexa in general, peri- or parametritis or hematocele, I must point out the dangers of radium, which can be advantageously replaced by diathermy and x-rays in measured doses of feeble penetration, given at different intervals. Thus I obtain the regression of lesions. The sedative and antiphlogistic power of physical agents diminishes gradually the indurated exudates and restores, in some cases, the physiologic uterine mobility. In other cases, with more pathology, the surgeon must step in. Later on, for adhesions, physical means may with advantage be resorted to.

The chief effects of the diathermic current are the diminution of vitality of the microorganisms and the activation of the normal cellular biochemical processes. The radiosensibility of the thermopenetration is like that of the x-rays and high-frequency, selective on the histoneoplastic elements. This selectivity has been lately established as a law, after it was brought to notice for cancer cells, in my work of 1900 (Congress of Paris), and in 1903 (Paris Academy of Medicine).

Diathermy has also a hemostatic, coagulative, sterilizing, and destructive power which, in gynecology, is frequently of the greatest value. Thus it is that for the treatment of cancer of the neck of the womb it powerfully aids the roentgen-rays which, in addition to their possible selective action on the cancer cells, tend to prevent extension along the pelvic lymphatic ganglia.

In simple ulcerations of the endocervical neck, with congestion of the organ and purulent discharge, electrothermopenetration procures with prompt cicatrization, a uterine decongestion, complete enough at times to render possible an ultimate fecundation, as pointed out in many German works.

The heat created by diathermy in the matrix and its adnexa ameliorates menstrual pains, ovarian hyperesthesia, and obstinate vaginismus. Thanks to the vascular drainage, the nervous stimulation, and



the improved metabolic balance, the nutrition of the cells is modified and brought more nearly to normalcy. Diathermic applications (twenty to thirty minutes) give to the uterus, the sensation of an agreeable internal heat, coinciding with the relief of pain. By their resistance, the tissues transform the current into calorific energy. The vagina offers an ideal field to physical therapy for the employment of diathermy, but the rectal avenue and the abdominal wall can also be used concurrently.

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Actinotherapy often relieves amenorrhea and dysmenorrhea; it is of benefit to troubles of the menopause. It is also successful in some cases of sterility, but my advice is not to limit the method to the ultraviolet rays; the infrared rays should be alternated with them.

What strikes the observers of physical therapy in general, is the revival of vital energy, the suppression of insomnia and hypochondriac tendencies.

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In the treatment of certain uterine fibromas, notwithstanding its unquestionable activity, the possible precision of its localization and its dosage, the chemoelectric ionization method of Apostoli is being, little by little, abandoned at the present time. I personally use the combined action of the roentgen rays and mild intrauterine ionization. This combined method, which I have employed for thirty years for fibroma uteri, involves no risk if carefully done. The association of intrauterine galvanotherapy with mild radiotherapy is painless.

What most impresses the first experimentors in these methods, is the inhibitory power of the irradiations on the loss of blood. The disappearance of metrorrhagia and the reduction in volume of the tumors are sometimes followed by the anticipated menopause which announces itself by flushings. The cessation of the periods is only temporary; however if they reappear, the fibroma may be seen to enlarge, but yields to some supplementary irradiations. The functional sterilization of the ovary, with the regression of the tumor often assures the return of the uterus almost to its normal dimensions.

The hemorrhagic fibroma of medium size and the fibromatous uterus with their radiosensitive cells, benefit greatly by the combined method. Surgery has its field, so has physiotherapy, in treating selected cases of fibromas of the uterus.

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*Uterine cancer.*—At the first International Medical Congress of Electrology and Radiology, held in Paris in 1900, I pointed out that high-

frequency scintillations have a selective power of destruction (which I called a cytolic action) on the cancer cells, while they stimulate the normal tissues in their fight against the enemy. At that time, I gave several examples of cancer cured or ameliorated, not only by that method of application of high-frequency energy, but also by what was afterwards called fulguration and electrocoagulation. I mentioned one case of epithelioma of the neck of the womb treated by needles connected with the little D'Arsonval solenoid and implanted in the cancerous tissue, which was nothing more than electrocoagulation. I employed the word coagulation.

In 1903, at the Academy of Medicine in Paris, I stressed the selective action of x-rays used in strong doses to attack cancer cells, and to prevent extensions after surgical removal of the mass. In order to prevent a return, high-frequency effluves and x-rays could advantageously be applied in the open wound during the operation and locally at different intervals after the wound had been closed.

When we can act at an early stage, beneficial results are frequent, and sometimes even in certain advanced cases, palliative effects can still be obtained. In the inoperable cases, where the most audacious surgery is powerless, much relief may be obtained by physical means.

The physical therapist, conscious of the powerful agents at his disposal, must not become so enthusiastic as to treat every case. Physical agents are most useful adjuvants, to both physician and surgeon, and often a real boon to many sufferers.

## THE RUPTURED UTERUS\*

By ASA B. DAVIS, M.D., F.A.C.S., NEW YORK, N. Y.

SEVERAL months ago our secretary requested a paper on rupture of the uterus to be read at this meeting. In responding to that call I am somewhat influenced by the suggestions made from time to time that, where the results of a particular study have been presented, it would be advantageous to continue the study and make subsequent reports to this Association.

In 1909, Dr. Ralph Waldo Lobenstine read a paper entitled "Rupture of the Uterus During Labor." His study was based upon the examples of this accident to be found in the records of the Lying-In Hospital, New York, from the years 1890 to 1909, representing a maternity service of some sixty thousand confinements during that time. His paper was published in our *Transactions* of 1909, and also in the *Bulletin of the Lying-In Hospital* (Vol. vi, No. 2).

I am indebted to Dr. James A. Harrar for his laborious and painstaking work in searching the records of the Lying-In Hospital from the time of Dr. Lobenstine's report to date.

Rupture of the uterus is a very broad term and rather devoid of enlightenment unless we know the condition of the patient, the character of the pregnancy, labor and its management, which preceded the rupture in every case.

It is doubtful if one can practice obstetrics for more than a short time before being impressed by the varying characteristics of each individual patient; their nervous poise, endurance under stress, the widely different character of their skeletal muscles and the form of the bony skeleton. Thus, a given patient will bear several children, her abdominal muscles developing and distending to meet the requirements of the progressing pregnancy. In the process of general involution following delivery there is a recoil of these muscles, they soon resume their proper place and function and approximate the pre-pregnant bodily configuration. In another case the abdominal muscles begin to yield rather early in pregnancy. In particular the recti lengthen and separate widely, allowing undue anteversion of the developing pregnant uterus. After labor involution is slower, the recoil is less and we note an increasingly pendulous abdomen after each succeeding pregnancy and labor. In the lower part of the birth canal we see vast differences in the tensile strength, elasticity and distensi-

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bility of the muscles. One patient will pass through a forceful rapid delivery. The vagina and vulva outlet will become dilated and distended, delivery being accomplished with little or no injury or laceration, the muscles soon regaining their normal tone. We meet examples of the other extreme wherein the progress of labor is slow. The presenting part barely reaches the pelvic floor and begins to distend the perineum and vulva outlet when, despite the use of all caution and skill in attempting to control and regulate advance, laceration suddenly occurs like tearing through wet paper, exposing the sphincter and lacerating the cutaneous covering of the perineum near or quite to the anus.

We know that some of the most disabling lacerations occur without visible breaks in the continuity of the mucous membrane of the vagina and perineum or the neighboring skin.

Age is another factor worth considering. There are a certain number of primiparae in the late thirties or early forties in whom distention will progress for a time, laceration occurring suddenly. In these cases, lacerations are usually along clean-cut lines.

Within the past few weeks the writer has been called upon by a young woman twenty-three years of age, and ten months after the delivery of her first child, to correct by extensive operative repair, well marked cystocele, rectocele and complete procidentia. It is not probable that prolonged labor and forcible instrumentation were entirely responsible for her condition.

May we not fairly argue that like variations obtain in the uterine muscles and in the mechanism designed to support and maintain the uterus in its proper axis and position?

In looking through the standard works on obstetrics under the caption "Rupture of the Uterus," one does not read far before meeting an attempt to estimate the relative frequency of the occurrence of this accident in labor. Williams states that it occurs once in every five hundred or a thousand cases. DeLee states that Freund, from the collected reports of seventeen authors, found one rupture to 2114 cases, but the individual reports varied from one in two hundred and thirty-four, to one in sixty-one hundred cases. Some of the older writers mention the subject and recognize the difficulty of estimating as to how often it occurs, because reports of the cause of death are often evaded, omitting the point that the rupture had occurred, or else many cases go unrecognized. In conclusion they state that we must turn to the maternity hospitals for accurate records. We begin to read hopefully in Craigin's *Textbook on Obstetrics* in which he says that in a series of twenty thousand consecutive deliveries at the Sloane Hospital, there were thirty cases of ruptured uterus treated. Fifteen of these occurred outside of the hospital and were admitted with this complication. If all cases at the hospital were considered,

it would make a frequency of one in  $666\frac{2}{3}$  cases. If only those occurring in the hospital were considered, the frequency would be one in  $1333\frac{1}{3}$  cases.

Without delusions or any degree of enthusiasm or satisfaction, we report 184 examples of rupture of the uterus occurring in the service of the Lying-In Hospital, New York, from 1890 to September 1, 1926, representing a service of 155,395 cases. For this purpose we include the 78 cases to be found in Dr. Lobenstine's article, the remaining 106 having occurred since 1909.

The total number of confinements, as stated, is not exact, owing to the fact that in our serial number (known in the records as "Confinement Number") there are included abortions, tubal pregnancies and hydatidiform moles. From other studies of our statistics it is fair to estimate that 5 per cent of the 155,395 confinements include these three classifications. Although it would be a tremendous task to segregate these cases, to refrain from doing so would be slipshod, were it possible to make the remainder of the study exact. Reducing our total number of cases by 5 per cent, or 7,770, we have 147,625 estimated actual confinements, with an incidence of rupture of the uterus as one in 810.

Without attempting too fine distinctions, it may be of interest to carry this analysis one step farther. Our records show that there were 91,208 confinements from January 1, 1909, to September 1, 1926. After making the 5 per cent deduction as before, discarding for the moment the 54 emergency cases and the 24 ruptures through cesarean scars (the latter being in uteri already artificially weakened), there remain 28 cases out of the total 106 which we report, which were entirely under the care of the hospital, an incidence of one in  $3257\frac{3}{4}$ .

The maternity hospitals cannot fairly estimate the relative frequency of this accident. They treat a greater number than is found in the community at large. Dr. Craigin reports that 50 per cent of the cases occurring in Sloane Hospital were emergencies brought in from outside. Of the 106 cases which we report, 52 were regular applicants and 54 emergencies sent in by midwives and private doctors. It should also be noted that complicated cases gravitate to hospitals.

Tables I and II show the incidence of rupture of the uterus as to parity and age. In the 106 cases there were but 8 in primiparae, all of them complete ruptures. The largest number is 16 in para iv. The parity ranges from 1 to 13. The range of age is from nineteen to forty-eight years. Twenty-seven occurred in the half decade between thirty and thirty-five years, 22 being complete ruptures. (Tables I and II.)

Following the usual classification, we have 88 examples of complete rupture of the uterus. Of these, 47 mothers died and 41 recovered.

TABLE I. RECORD OF PARITY

64 COMPLETE RUPTURES		24 RUPTURED CESAREANS		18 INCOMPLETE RUPTURES	
No.	Parity	No.	Parity	No.	Parity
8	I	9	II	2	II
6	II	5	III	1	III
6	III	2	IV	4	IV
10	IV	3	V	2	V
6	V	2	VI	3	VI
9	VI	1	IX	1	VII
2	VII	2	XIII	1	VIII
4	VIII			3	IX
4	IX			1 Parity not noted.	
2	X				
1	XI				
6	Parity not noted.				

TABLE II. RECORD OF AGE

15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 to 45	45 to 50
<i>64 Complete Ruptures</i>						
	6	15	14	13	8	1
(In 7 cases the age was not noted)						
<i>24 Ruptured Cesareans</i>						
1	9	3	8	2		
(In 1 case the age was not noted)						
<i>18 Incomplete Ruptures</i>						
	2	3	5	5	2	
(In 1 case the age was not noted)						
1	17	21	27	20	10	1

There were 75 stillbirths, 13 children lived. In the 18 cases of incomplete rupture, 10 mothers died and 8 survived; 11 children were stillborn, 6 lived and no note is found in the case of one child.

Included in the total of 88 complete ruptures are 24 which occurred through former cesarean scars. Twenty-one of these mothers lived, 3 died and 5 children survived.

Among the 64 cases of complete rupture, other than those through cesarean scars, 44 were emergencies. Thirty-four of these mothers died and 10 lived. Forty-two children were stillborn, 2 survived. Of the 20 regular applicants, 10 mothers died and 10 lived. Fourteen of the children were stillborn, 6 lived.

In the 18 cases of incomplete rupture, 10 were emergencies. Five of these mothers lived, 5 died. Eight children were stillborn and one survived. Among the 5 regular applicants 3 mothers died and 2 lived. Two of the children were stillborn and 3 lived. In 3 cases it was not noted as to whether they were emergencies or regular applicants. Two of these mothers died and one lived. There was one unclassified stillbirth, one child who lived and one case which is not noted.

We find it impossible to give an adequate idea of the 104 examples of this complication without presenting an extract of the history in

each case. This is not feasible. In this list are to be found examples of almost every form of ruptured uterus that has ever been recorded.

Among the cases of complete rupture, we find as a contributing cause at least two cases of former ventrofixation, three of placenta previa and two with fibroids in or near the cervix. There are several cases of accouchement forcé on account of prolapsed cord, also one in eclampsia. In one case six months' pregnant, rupture occurred while the patient was straining at stool. Supravaginal hysterectomy was promptly done, the patient being discharged from the hospital on the eighteenth day postoperative. There were two cases admitted with complete rupture, on whom version and partial breech extraction had been done, leaving a decapitated head in the uterus. Another was admitted four days after delivery, septic. Her pulse was 140, temperature 105° and there were fifty-six ounces of urine in the bladder. We note two cases admitted after delivery infected with *Bacillus aerogenes capsulatus*. We are often tempted to suture these wounds or rely upon packing the uterus. In four instances in which the wound was sutured one patient survived. Hysterectomy is the operation of choice and was employed in the cases of 32 of the 64 patients. The sooner this operation is performed after rupture has occurred, the better are the chances for recovery.

While rupture through the cesarean scar in a subsequent pregnancy is a serious accident, we find that the prognosis for the mother is far better than in the other cases of complete rupture. Of the 24 mothers included in this group, 21 recovered. For the baby the prognosis is bad, we were able to save only 5 of the 24. In 4 instances subtotal hysterectomy was done, 2 of the 3 maternal deaths following this operation.

It is often very difficult to calculate the duration of pregnancy in the class of patient with whom we deal because comparatively few of them pay much attention to the date of their last menstruation. In practically every one of these cases rupture occurred at or near full term. We find that many patients allow themselves to go on in labor for several hours before notifying a doctor or reporting at the hospital; notwithstanding the fact that they had been repeatedly warned of the danger involved by neglecting to do so. They explain that they hoped to be delivered in the normal way. In some cases the interval was short between the onset of labor and occurrence of rupture. One patient was awakened at two o'clock in the morning by a sudden pain (C. N. 29691). She arrived at the hospital from a considerable distance an hour later, pulseless and, while being admitted, respirations ceased. Artificial respiration was done by the admitting nurse and I, being in the hospital at the time, was notified. All haste was made to begin operating, at the same time assistants were giving intravenous salt solution. When the abdomen was opened it was

found full of clots, with the child and placenta free among the intestines. The child, placenta and clots were hastily removed and the edges of the rent in the uterus freshened and sutured. The patient lived and was discharged from hospital on the fourteenth day. Two and a half years later she was delivered of a living child by cesarean section.

In many of these cases we find considerable hemorrhage and well marked shock; while in others comparatively little bleeding occurs, separation having taken place, the wound is plugged by the placenta. In some there had only been slight union of the muscles following the previous cesarean, and the rent occurs through scar tissue which does not bleed seriously. We believe that the best treatment for these cases is to freshen the edges and resuture the wound, ending the operation as quickly as possible and postponing further operative procedure, such as hysterectomy or sterilization, until some future time when the patient will probably be in better condition.

Any patient who has been subjected to cesarean section should be in the hospital a week or ten days before expected full term in a subsequent pregnancy. And, where it is known that a patient must again be delivered by this operation, it should be done before the onset of labor. In this type of rupture we are dealing with a very different proposition from the conditions which are found in the ordinary complete rupture. These wounds are not infected; they are limited to cesarean scars, and the tissues about them have not been unduly stretched and contused.

In the eighteen cases of incomplete rupture we find five placenta previas; one case of hydrocephalus; two cases of face and one brow presentation; two accidental hemorrhages and one in transverse presentation, and one extension of old cervical laceration, marked Bandl's ring, unsuccessful high forceps and version. Six cases were admitted after having been delivered by midwives or private doctors. Version was done or attempted in ten instances, hysterectomy in six.

It must be acknowledged that rupture of the uterus does occur and that it will continue to occur. It behooves us to put forth every effort in order that it shall happen as infrequently as possible.

At our 1917 meeting I advised: "The time to treat eclampsia is before it occurs." Not that that statement has had much influence, yet eclampsia is rapidly being brought under control.

A vast amount has been written about the treatment of puerperal sepsis. The results are not brilliant in serious cases. Is it not high time to pay more attention to the prevention of this condition? It is rarely met with now in the wards of well conducted maternities. Make such results general. The time to treat rupture of the uterus is before it occurs. In the last analysis it means better, more conscientious



tious and systematic care during pregnancy, labor and the postpartum state.

Patients should come under observation earlier in pregnancy. A careful history is most important. It should not be possible for a patient to give histories of repeated consecutive stillbirths. The history of giving birth to unduly large children is worthy of note. Patients subject to toxemia in former pregnancies should be carefully watched for its recurrence and treated accordingly. Contracted pelvises should be detected early, and probable disproportion between the fetus and pelvic capacity be foreseen long before onset of labor. Obstructing newgrowths should be found, or any previous corrective operation such as amputation of the cervix, suspension or fixation of the uterus, extensive scars in the cervix which will probably check or impede dilatation. Crossbirths and other malpositions should be detected early in labor if possible, and means taken to correct the position or hasten delivery before danger of rupture, which is very liable in these cases. In placenta previa, where the internal os is largely or entirely covered with the placenta, patients are entitled to early cesarean section. Cases of prolonged labor without advance, with developing tonic contraction of the uterus, flattening out of the abdomen, irregular in form, showing Bandl's ring obliquely across the abdomen with round ligaments standing out in bold relief, often with the cervix caught between the presenting part and the back of the symphysis, mean that the lower uterine segment is being unduly thinned and made tense, and that rupture of the uterus is impending. Often at this time the bladder will fill rapidly and unless emptied gives added strain. Such cases should be delivered without delay. With the lower part of the uterus stretched almost to the tearing point, it is not a good time to suddenly add a rapidly acting force such as pituitrin. Early transfusion will help to save more of these cases than was possible formerly.

## COMPARISON OF METHODS USED IN TREATMENT OF MALIGNANCY\*

BY G. W. CRILE, M.D., CLEVELAND, OHIO

*(From the Cleveland Clinic)*

ANY consideration of the treatment of malignant tumors, wherever situated, must center about the following queries: (1) Is the condition operable or inoperable? (2) If inoperable, what palliative method will give the greatest comfort to the patient? (3) If the case is operable, what method will most completely remove the growth and provide against its extension? A discussion of the treatment of malignant tumors must include also conditions generally considered as premalignant, since it is impossible to state with finality in any case at what moment the transition from premalignancy to definite malignancy will be made.

With the rapid development of methods for the application of the roentgen ray and of radium, together with the ever-present possibility that in the many laboratories devoted to the study of cancer some new and effective measure may at any time be developed, it is obvious that the surgeon, while maintaining as an inflexible standard of procedure the radical removal of the premalignant and of the malignant lesion, if operable, must maintain at the same time a flexible standard as to the method for such removal; that is, a standard which may be modified or changed in the light of his own accumulated experience and of new developments in treatment.

Among the premalignant conditions with which the surgeon should be prepared to deal are keratoses, warts, pigmented moles, chronic infection of the lymphatic glands, old scars, especially those exposed to irritation, cracks and fissures of the lip, ulcers of the tongue and cheek, benign papilloma of the larynx, benign bronchial tumors, fetal adenoma of the thyroid, cysts and other benign tumors of the breasts, chronic ulcers of the stomach and rectum, benign tumors of the uterus, and such lesions as laceration or inflammation of the cervix. Any of these conditions when first seen by the surgeon appear to be unquestionably benign, but he should always bear in mind that they carry with them a potential malignancy. The sine qua non in dealing with any of these premalignant conditions is that it should be completely eradicated or let alone. Partial eradication of any of these conditions may mean the lighting up of a previously harmless condition into a

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rapidly growing malignant process. A long list of examples might be given, but it is sufficient to cite here only such outstanding instances of unfortunate sequelae as the precipitation and dissemination of a fatal malignancy after the incomplete dissection of a pigmented mole by the use of the electric needle, or the development of carcinoma of the breast after the partial removal of a precancerous, benign tumor, or of a chronic cystic mastitis.

The problem presented to the surgeon by the patient with a definitely malignant lesion is simple as compared with that presented by the patient with a potentially malignant condition. Once a decision has been made as to whether in the individual case a possibly pre-malignant condition is to be eradicated or let alone, it is important in either case that the patient be inspected at frequent intervals just as after the removal of an established cancer. The surgeon should be guided in his decision as to his procedure in any individual case by the age of the patient, that is, whether or not he is in the cancer period of life; by the presence or absence of a familial history of cancer, for there is still too much uncertainty regarding the inheritance factor for the possibility that such a factor exists to be ignored; and third, by the degree of possibility that adequate relief will follow the removal of the condition.

Radium, or roentgen ray, or surgical operation is to be employed according to the location or character of the precancerous lesion. When such lesions are readily accessible, as on the face, tongue, nose, cervix, and lower rectum, radium alone or a combination of roentgen ray and radium is usually to be preferred. In cases of benign tumors of the breast, or ulcers of the stomach, wide excision is the method of choice.

Once the malignant condition has developed, then, as stated above, the first decision to be made by the surgeon is whether the condition is operable or inoperable and then the method of choice under either condition must be determined. No general rule can be given which can apply to malignant conditions in every part of the body. In this discussion, therefore, we shall consider the various malignant conditions according to the organs and tissues involved.

*Malignant Conditions of the Skin.*—Malignant conditions of the skin, like premalignant conditions, are best treated by radiation.

*Malignant Bone Tumors.*—The Registry of Bone Sarcoma, conducted by the American College of Surgeons, has accumulated extensive data, on the basis of which it appears still to be uncertain whether a primary malignant bone tumor should be treated by surgery or by radiation. Pre- and postoperative radiation by the x-ray is certainly indicated. If the condition is in the limb and is not obviously inoperable, amputation should immediately follow radiation. In the case of a metastatic tumor of the bones, palliative treatment by the

x-ray is the only measure. Radium is contraindicated, as it will destroy the periosteum and necrosis will result.

*Malignant Conditions of the Mouth.*—Malignant disease of the mucous membranes of the mouth should be treated by wide excision. The very early stages of cancer of the tongue should be treated by excision, electric coagulation, or the electric cautery; late stages, by excision together with block dissection of the glands of the neck. Cancer of the lip, if seen in its early stages, should be treated by radium; in its late stages, like late stages of cancer of the tongue, by wide excision and by block dissection of the gland-bearing areas of the neck.

*Carcinoma of the Larynx.*—In dealing with carcinoma of the larynx, the problem of the surgeon is simpler than in the case of cancer in almost any other part of the body. Cancer of the larynx is usually discovered in its earliest stages, for the voice of the patient at once makes obvious the presence of a condition which demands attention, so that he promptly seeks the physician or laryngologist for relief. Moreover, intrinsic cancer of the larynx is enclosed within a practically impermeable cartilage box so that the process can be completely removed with the larynx, the only permanently disabling result being the loss of voice, which in our cases has been amply compensated for by the development of a buccal whisper. In cases of extrinsic carcinoma of the larynx the situation is not so favorable. In such a case, removal of the larynx together with block dissection of the contingent gland-bearing areas is indicated if the condition is operable; if inoperable, tracheotomy with radiation is indicated. In the case of either an intrinsic, or an operable extrinsic carcinoma of the larynx, however, postoperative radiation should be applied; in the former instance, since it is always possible that some malignant cells may have escaped into the surrounding tissues, and in the latter the danger of dissemination is obvious.

*Malignant Diseases of the Thyroid Gland.*—Since approximately 95 per cent of all malignant diseases of the thyroid gland are due to a degeneration of a fetal adenoma, it is evident that if all fetal adenomata were removed as soon as their presence was discovered, malignant diseases of the thyroid would be practically eliminated. The presence of a fetal adenoma is readily determined. It is present from birth, is a discrete tumor, usually unilateral and freely movable. It is the easiest of all types of goiters to remove. Once malignant changes have taken place in the gland it should be removed surgically if possible, otherwise it should be treated with radium. If the malignant process has developed to the inoperable stage, a decompression operation will give temporary relief from obstruction and the resultant partial asphyxiation, this operation being followed by radiation. A patient with an inoperable carcinoma of the thyroid will live

without radiation for approximately a year. There is, at present, no basis upon which to found a judgment as to the length of life when such a case is treated with radiation. In all cases of malignant diseases of the thyroid, however treated, the possibility that myxedema will develop should be borne in mind. This condition, however, is readily met by the administration of thyroid extract.

*Malignant Diseases of the Breast.*—There has been a great deal of discussion during recent years regarding the relative values of radium with deep roentgen-ray therapy and radical operation in the treatment of breast carcinoma. These discussions have centered upon three phases of the problem: (1) the value of preoperative radiation, (2) the value of postoperative radiation, (3) the value of radiation in preference to surgery.

As for postoperative roentgen-ray therapy, at the present time we do not favor its use. Dr. Portmann, in his study of our statistics, found that 35 per cent of the cases in which postoperative radiation was applied showed recurrences in the first year after operation, whereas only 16.5 per cent showed recurrences in the first year when no radiation was used. The scope of this paper does not permit time for discussion of what may be the reasons for these untoward results of postoperative radiation excepting to state that it is probable that such malignant cells as, especially in advanced cases of carcinoma of the breast, must often remain after even the most radical removal of the gland-bearing areas, are lighted up to increased activity by the radiation, or else that the natural resistance of the cells is interfered with.

As for the use of radiation in preference to surgery, it is not justified at the present time excepting in the cases of patients who for any reason refuse operation. If a case is completely inoperable, radiation may be applied as a palliative measure. Dr. Portmann has found that he has had inoperable cases who have lived comfortably past a three-year period after radiation alone. Statistical studies of cases of cancer of the breast present one interesting and encouraging fact, as has been shown by Dr. Bunts, who from a study of our total series of breast cases found that there was "apparent reversal during more recent years of the incidence relation between benign and malignant tumors. It would seem that this might well be attributed to the fact that now earlier consultation is sought by women who discover an abnormal condition in the breast so that it is first seen and the operation performed while the tumor is still benign."

*Carcinoma of the Stomach.*—Carcinoma of the stomach is one of the most discouraging conditions presented to the surgeon. Its rapidity of growth, and the rapidity with which lymphatic involvement is extended may lead to the establishment of an inoperable status at a very early period in its progress. A period of only a few weeks may

carry the patient from an operable to a completely inoperable status. Surgery is the only available method in the treatment of these cases. If the condition is operable, resection with the widest possible excision of the growth is the indicated procedure, together with the application of every restorative measure which is at the disposal of the surgeon, blood transfusion, saline injections, minimum anesthesia with nitrous oxide which should not pass beyond the stage of analgesia, and divided operation. We have found recently that the application of diathermy during and after the operation is of material aid in increasing the resistance of the patient, by its directly conserving effect upon the function of the liver.

The relation between ulcer of the stomach and cancer remains to be finally established. Nevertheless, patients with ulcer of the stomach should be given the advantage of complete removal of the ulcer by operation. The reason radiation cannot be applied in these cases is because it is impossible to deliver sufficient radiation to the stomach to destroy a malignant process without harming the adrenals and the liver, so that radiation impairs rather than improves the prognosis.

*Carcinoma of the Esophagus.*—Carcinoma of the esophagus is best treated by radium applied through an esophagostomy. Deep roentgen-ray therapy is not applicable in these cases, as the radiation may produce a fibrosis of the lung.

*Carcinoma of the Large Intestine and Rectum.*—At the present time, as the result of a combined investigation by the radiologists and surgeons of the Cleveland Clinic, we have adopted the following tentative conclusions: We are constantly studying our results, and these conclusions and procedures will be modified as these investigations may indicate.

Cases of carcinoma of the large intestine and rectum should be operated upon if possible and radiation should be applied after the operation, excepting in cases in which the growth is low enough in the rectum to be readily accessible, when the implantation of radium needles and the application of radium packs may be sufficient. In all cases in which operation is performed, however, a colostomy followed by radical operation is indicated; in inoperable cases, colostomy plus radiation is indicated. A period of about ten days should elapse after the colostomy before any decision regarding the method of treatment is made, as that period is necessary to allow the inflammatory reactions of the disease to subside sufficiently for an exploration to determine the operation to be made. In many cases the entire picture may change during this period of rest. After the decision is made, either the radical operation or radiation is applied. Following the radium treatment deep roentgen-ray therapy is applied by the cross-fire method. In recurrences after operation, radiation is of trivial value. In recurrences after radiation, surgery is of trivial value.

In the case of cancer of the small intestines, which fortunately is of very rare occurrence, radiation is of little avail and the case should be treated like cases of carcinoma of the stomach.

*Carcinoma of the Uterus.*—The treatment of carcinoma of the fundus at the present time offers little basis for discussion. Surgical treatment still offers such results that thus far the attention of radiologists has not been extensively directed to its treatment. In inoperable cases, however, deep roentgen-ray therapy offers palliation and prolongation of life, and it may be that accumulating experience will show that these cases, like cases of carcinoma of the cervix, may well be yielded to the radiologists.

For carcinoma of the cervix the method of choice at the present time is radiation. Apparently the results of the radiation treatment of carcinoma of the cervix have not been equaled in any other field. The preferred method is a combination of radium and the roentgen ray, the former being the more important factor. Deep roentgen-ray therapy, however, is an important adjunct in building up the radium dosage at a distance from the cervix itself.

*Malignant Tumors of the Genitourinary Organs.*—Malignant tumors of the kidney and of the testes are treated by surgery plus radiation both before and after the operation. In many cases tumors of the kidney will diminish so rapidly in size that cases which have seemed to be inoperable become readily operable. Tumors of these organs should be radiated no matter how hopeless the outlook.

In cases of bladder tumor radiation appears to have been of some value but the results are too uncertain for this method to be depended upon. Surgical removal, therefore, remains the method of choice. Postoperative radiation, however, may be used, principally because of the hope that it may be of avail rather than because of any definite results that have been secured up to the present time.

As for malignant tumors of the prostate, the same conditions hold as in the case of bladder tumors. In cases in which a high blood urea makes operation too hazardous, radiation may provide the only method of treatment and in certain cases may tide the patient over until the radical operation can be performed.

It will have been noted that throughout this discussion no reference has been made to any form of treatment excepting surgery and radiation. Serum therapy has been proposed from time to time and has been as frequently discarded by those who have investigated its possibilities. During recent months the investigations by W. Blair Bell of Liverpool have revived interest in the possibility of the use of colloidal metals, of lead in particular. Following his lead we have been applying colloidal lead solutions in certain inoperable cases but, although it is too soon for us to make any definite statement regarding

our results, up to the present time they have not been encouraging. As far as this method is concerned we must for the present take Blair Bell's own position that "the time is not yet ripe for the general employment of lead, for a vast amount of work, experimental and therapeutic, still remains to be accomplished."

## OBSERVATIONS ON HEART DISEASE COMPLICATING PREGNANCY\*

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TO SOME it may seem that the problem of heart disease complicating pregnancy is settled. To us it seems otherwise.

Our interest in this subject dates from 1915. In that year one of us (Kellogg) collected and studied all these cases that had entered the Boston Lying-In Hospital since 1873. A study of the literature was made at the same time. It was found that almost invariably cases entered the hospital only after decompensation and that the maternal mortality in these decompensated cases was 45 per cent. The literature was found to consist for the most part of vague generalities.

Our prenatal clinics had then been in operation four years and a study of the work of these clinics in relation to cardiac disease in pregnancy showed that they had so far helped little in improving this truly frightful mortality.

Obviously we were confronted by a problem and for the five years 1915 to 1920, somewhat impeded by the war, we tried to meet it by various phases of what we have called the "casual consultant system." This system covers the individual needs of any special cardiac emergency case very well. But modern obstetrics, as is well known, demands that every pregnancy case receive prenatal and postnatal care, and it logically follows that pregnant women with cardiac disease deserve repeated consultations between obstetrician and heart consultant. The "casual consultant system" is, therefore, ill suited to the standards of a modern pregnancy clinic including any large number of cardiac cases. Nor does that system tend to make possible the collection of accurate data, which is a necessary function of all modern clinics.

When, in recent years, special cardiac clinics grew up in the general hospitals, this hospital (and other obstetric hospitals elsewhere did

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likewise) took advantage of the opportunity and affiliated with a neighboring cardiac clinic. This proved of great benefit, but necessitated a patient's attending two separate clinics, and as can easily be seen there were difficulties in the transfer of records from one clinic to the other and hence delay in consultation; also a gap was left in consultations and in record keeping during the patient's stay in hospital (during confinement and puerperium and during preparation for confinement, which among the cardiac cases often necessitates prolonged rest in hospital).

The ideal system, to which the "casual consultant" and the "consulting clinic" leads, is clearly a special cardiac clinic within the lying-in hospital.

In 1921, a policy was tried in this hospital of grouping certain cases, representing a few of the more prominent obstetric problems, in special services, and assigning each group to different members of the staff for intensive study during the period of a year. For example, in one group bleeding cases were placed, in another, cases of toxemias, in a third, cases with complicating heart disease, with only the last of which we are concerned. The formation of this special service for pregnant cases with heart disease led by degrees, with the increasing interest and experience in the difficulties of this special problem, directly to the formation of the cardiac clinic in conjunction with the hospital's prenatal clinics, and its growth to its present proportions. The present clinic, then, represents not a preconceived plan forced upon the hospital, but the result of a natural need, and actual experience in meeting this need.

Yet in 1924 there were but two such clinics, to our knowledge, within lying-in hospitals exclusively for the treatment of women with heart disease complicating pregnancy.

Hence we feel justified in our belief that the subject is not yet settled. To date under this system from 1921 to 1926, 882 patients have passed through this clinic or have come into the house as emergencies. Practically all these cases have come under the repeated observation of the cardiologist. They were referred on the basis that each had something suspicious of cardiac disease. Of the 882 cases, 218, about 25 per cent, proved to be true cardiac disease, most of them rheumatic heart disease, class one.

It is on this material, together with our own cardiac cases and consultations in a not inconsiderable number of private cases, that the following observations are made.

In spite of this experience we do not yet feel that the material warrants minute analysis and a setting down of final conclusions and we, therefore, prefer to consider this in the nature of a preliminary paper, and to make certain observations which seem true, and to discuss certain moot points in the obstetric handling of these patients.

Approximately 7.5 per cent of the whole pregnancy clinic shows something in the history or physical examination to require a decision on the heart condition. These patients can be readily sorted into: (1) A group that has *no true evidence of heart disease*, but complains of breathlessness, rapid heart, heart pain, fainting, giddiness, etc. They can be classified as *cardiac neurosis* or *neurasthenia*. Such cases do not develop heart failure and on the whole do well through pregnancy without any special care of the heart. Many of this group are unhappy and disabled by their symptoms. They deserve for their comfort, reassurance and hygienic regime.

(2) There is another group of patients with systole murmurs, or doubtful enlargement, third heart sounds, or extrasystoles; or some combinations of these findings. It is impossible to say certainly that they have no heart disease. They are "*possible*" or *undiagnosable hearts*. Such patients, if classified as having no significant disorder of the heart and handled with no special medical precaution except special observation of the cardiac vascular condition, have been found to go through pregnancy without developing heart failure. They do as well as normal patients.

(3) The residue, patients with *significant heart disease* shown by gross enlargement, diastolic murmurs, signs of true decompensation (congestive heart failure) or a significant disorder of the heart beat such as auricular fibrillation, or some combination of these findings, form from 1 to 2 per cent of all pregnancy cases.

A small number of this group have cardiovascular syphilis or congenital heart, or disorders of the heart beat, such as paroxysmal tachycardia or paroxysmal auricular fibrillation. Each one of these groups deserves special treatment in so far as the problems of pregnancy are concerned. They are comparatively small groups and we will not discuss them here.

By far the greatest number of patients with significant heart disease complicating pregnancy have *rheumatic heart disease* with mitral stenosis or aortic regurgitation, or both. As a rule they are patients who contracted their disease in girlhood and adolescence, and represent the successful cases that have gone through to adult life. This group affords a distinctly greater risk of maternal death and loss of baby than normals. They deserve careful following through pregnancy by specially trained internist and obstetrician working together.

One cannot generalize on the control of this group very satisfactorily. But there are certain broad principles which seem clear to us from our experience.

When shall we advise a woman with a heart disease not to become pregnant?

This question unfortunately seldom comes up for decision. But a patient with a serious heart condition should be warned that: (1) She takes a risk, approximately of 5 per cent of death during pregnancy or puerperium. (2) She takes a larger risk, possibly 10 per cent, of surviving but of failing to have a live baby at the end of her pregnancy. (3) She takes a less clearly statable risk of permanent or prolonged temporary disability. (4) She must (in order to keep her risks as low as the above figures) be prepared to follow explicitly rules of rest through pregnancy, and go to the hospital at once on the signs of failure and to consent to interruption of pregnancy on indications. If she has certain signs, which will be discussed under the next heading, she should be advised against pregnancy as promising a much greater risk than the above.

When do we advise interruption early in pregnancy for cardiac complications?

(1) For a patient who has or has had clear signs of congestive failure. (2) For a patient who has a complicating nephritis or hypertension. (3) For a patient who has auricular fibrillation, absolute disorder of the heart beat. (4) For a patient who has had a recent or has at present a rheumatic fever.

From our experience it is unlikely that a woman who has any one of these complications can survive pregnancy, though we have seen individual cases in all these groups survive.

Where any of the above complications occur in mid or late pregnancy, it has been our custom to try prolonged rest in a hospital under medical treatment directed to the heart in an endeavor to secure a viable child, except in the cases who develop decompensation which fails to clear promptly on rest in bed and medical treatment.

There is one absolute rule which has appeared clear to us. *If a patient with a heart disease develops decompensation during pregnancy she belongs in a hospital till the pregnancy is terminated.* The only clearly avoidable mishaps that we have seen have been among patients where this rule has been disregarded.

The indications for sterilization following delivery are the same, by and large, as those given for interrupting pregnancy. It is, however, in our opinion justifiable to sterilize a patient with a clearly seriously damaged heart who has not yet developed any of these particularly dangerous conditions, providing the patient requests it in the full knowledge of her risk with future pregnancy. The fact that a cardiac has survived one or more pregnancies without decompensation does not justify the assumption that she will continue to succeed.

Though prolonged experience with heart disease complicating pregnancy has shown us clearly that the true cardiacs take a distinctly greater risk than normals, and that this is so in spite of all possible precautions, we have also found that many of the alarming cardiac

symptoms complained of by patients and many of the signs suggesting heart disease are of no consequence whatsoever. On the whole we feel that interruption of pregnancy and sterilization have been performed less often since intensive care and observation of the cardiacs have been accomplished. We wish to emphasize again, however, the fact that cardiacs are a serious pregnancy risk.

Decompensation during pregnancy in cardiac patients previously not disabled occurs: (1) From disobedience of rules for control of activity. (2) From intercurrent disease not predictable and largely not avoidable. (3) Occasionally from a sudden cardiac complication such as auricular fibrillation, which is not predictable. The majority of patients with severely damaged hearts, but without the four particularly dangerous complications mentioned above, prove able to stand pregnancy under proper conditions without apparent ill effects. But the purely mechanical burden of uncomplicated pregnancy is so great that we have many times seen individual cardiac cases who have previously led active lives without any disability and who have followed our advice to the letter through early pregnancy and who have had no complications of pregnancy, forced into decompensation at about the sixth month. And we have seen this decompensation persist even under continued rest in bed and thorough medical treatment. In some cases the decompensation is continued for many weeks after an uncomplicated delivery, and then full activity is returned once the burden of pregnancy is finally gone.

It is clear that the 1 to 2 per cent of true heart disease in pregnancy places this as one of the major problems in pathologic obstetrics. Under present day management it is likely that the "cardiac" in pregnancy is just as common as the case with convulsive toxemia.

We have seen it stated that the cardiac pregnancy case: (1) Has an easy delivery. (2) Miscarries if decompensation occurs. In experience with a long series of such cases, though the first is true in many cases, an occasional disheartening exception is sure to occur. The second, when it occurs, occurs chiefly as an unwelcome complication of a dangerously decompensated case that requires not the added strain of immediate delivery but the greatest possible rest and relief from strain to improve the condition before delivery.

These general observations of cardiac disease in pregnancy are from the medical viewpoint and exemplify the opinions which we, as obstetricians, accept. When we approach the matter of the actual obstetric handling of a given case there is a divergence of opinion. Some of the staff are very prone to resort to abdominal cesarean section under morphine-scopolamine and local novocaine anesthesia, with very frequent resort to sterilization at that time by ligation and burial of the tubes, in true heart disease cases. This is very clearly

shown by the following figures taken from the cardiac index. Nearly 30 per cent of class I rheumatic heart disease cases, multiparous and primiparous, were delivered by abdominal cesarean section. Roughly, 55 per cent of these were delivered under ether and 45 per cent under morphine-seopolamine and local anesthesia. Of the morphine-seopolamine cases approximately 75 per cent were sterilized. Some of us, including the obstetric author of this paper, take issue with this method of treatment on three counts, the first two very definitely, the last with more uncertainty. The first point of issue is the question of anesthesia. We believe ether is the anesthetic of choice, very carefully given, especially in its initial stage, and that the drop open method is the best way to give the ether. The reasons for this belief are that personally we have never seen ether properly administered do a female cardiac any harm, and that we think we have seen seopolamine do harm to such a patient. Second, the element of time. It takes us half as long or less to do a cesarean under ether as it does to do one under morphine-seopolamine and local anesthesia. We think this time element very important in a sick cardiac and in one who is not sick we see no occasion for avoiding ether. The third reason for this belief is that if the twilight sleep excites the patient and one is obliged to change to a general anesthetic in the midst of the excitement acute cardiac failure and death may result. The second point of issue, we believe the majority of multiparous cardiacs are safest delivered by forceps at full dilatation from below with sterilization some months subsequently if it is advisable. In other words, we do not believe it is justifiable to do a cesarean *for the sake of sterilization*, on account of the greater cesarean risk, and incidentally because sterilization done on the nonpregnant uterus is more likely to remain sterile than on the uterus in the pregnant state. The third point of issue is that we believe many primiparous cardiacs who have gone to full term without decompensation can be safely put through a first stage under the common analgesics and delivered at full dilatation with forceps under ether more safely than by cesarean. Which of these opinions is better only a larger accumulation of material will show. Perhaps each has its proper place and we need only more knowledge to correctly apply our procedure to the right case.

In conclusion we believe that there is still much to learn on this subject and that it is essential that every obstetric hospital have a cardiac clinic under a cardiologist and at most one assistant, not a larger personnel, so that one point of view is maintained over a long period of time, with the accumulation of much clinical data, and only in this way we believe the problem of heart disease complicating pregnancy can be truly answered.

## THE DEVELOPMENTALLY UNFIT INFANT\*

BY G. VAN AMBER BROWN, M.D., DETROIT, MICH.

"The rose-seed holds the glory of the rose;  
Within its heart sweet summer fragrance bides,  
And there each petal's tender blush-tint hides,  
Till June bids nature all her charms disclose.

"The sleeping infant's heart and brain may hold  
The glorious power that in future years  
Shall move the listening world to smiles and tears;  
'Tis life potential that the days unfold.

"One act of Will Divine, and lo! the seed  
Of growth was sown in young creation's heart,  
From Life Eternal hath all life its start  
And endless change as changeless law we read." —*Anaxagoras.*

THE problem of the developmentally unfit infant is more and more attracting the attention of parents, educators and the medical profession, for it depends upon the proper prevention and treatment whether the race as a whole becomes better or worse, as the child of today is the citizen of tomorrow. Since the treatment of the infant, prenatal and postnatal, is at present conducted quite to the exclusion of a hereditary consideration, it is the purpose of this paper to make a plea for greater activities by this Society and the medical profession generally along eugenic lines, in considering this topic. The discussion is based upon the proposition that in dealing with this problem greater good is to be obtained from preventive (eugenic), than from curative, treatment.

I assume the developmentally unfit infant to mean one who is hereditarily socially unsuitable, emotionally or intellectually, and not one who merely has defects which are the result of some childhood disease, or somatic mutilations in delivery at birth, or later. H. S. Jennings' recent contribution on the subject of the relative effects of heredity and environment, very clearly points out the fallacy of attributing any vital phenomena exclusively to either force. In the unfit, environment can be credited with about 20 per cent; heredity about 80 per cent.

The choice of course to be pursued in dealing with those that are unfit from environmental causes is comparatively easy, since as phy-

\*Read at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, held in Chicago, Ill., September 20, 21, 22, 1926.

sicians we must devote our skill and knowledge first to healing the sick and patching up the sort of people that are already born; thus aiding them to acquire social fitness. In the procreative period, if their heredity is sufficiently good and they are self-supporting and able in prospect to support their young, marriage may be permissible or advisable; particularly if their stock was good enough to provide financially for them and consequently does not have to be done at the expense of other people who have all the children of their own they can possibly properly care for.

Concerning the 80 per cent, the hereditarily unfit, the problem should be dealt with solely by preventive measures and not by present-day methods of charity only. For while brute nature slays its thousands, hand to mouth charity will in the end slay its tens of thousands. It has been said, and I think truly, that "unwise charity creates half the misery in the world and charity can never relieve one-half of the misery which it creates." True charity extends not only to this, but to future generations.

#### BIOLOGIC CONSIDERATION

In our combined goodness of heart and ignorance of biology, we are deceived by the occasional gratifying and amazing results of education and good environment. We seem to believe that rescue homes and orphanages are ends in themselves; on the contrary, they are merely stop gaps in the great stream of human misery. Charity will no more stop that stream than a dam half-way across will stop a river. Even though built entirely across, it only increases the river's weight and power. Such methods can only lead to the downfall of our civilization. We fail to observe that the lowly are mostly the children and grandchildren of the same type which our parents and grandparents cared for, only they are more numerous, while those who care for them are relatively less numerous.

"Without realizing it, we are today playing with life and heredity upon a perfectly stupendous scale. Vast sums of money are appropriated to stamp out tuberculosis, to care for the crippled and deformed. Great institutions are built to screen insanity from public view, until their inmates are 'cured' and returned to society and to reproduction. Hospitals are everywhere established to prolong the life of those to whom nature gave a shakely constitution. Great milk funds are raised for feeding babies born to lives of feebleness, from mothers too weak by nature to suckle their own offspring, and from parents, one or both of whom are too feeble mentally to provide food for their children. Special hospital wards are furnished for bringing charity babes into the world from parents too incompetent to earn money to pay even for their birth, let alone for subsequent rearing."—(Wiggam.)

Professor Karl Pearson, the English biological mathematician, in a recent Cavendish lecture to the British medical profession, said, "Gentlemen, you are enabling the deformed to live, the blind to see, the weakling to survive, and it is partly due to the social provision made for the weaklings. The feeble-minded woman goes to the workhouse for her fourth or fifth illegitimate child, while the insane man, overcome by the

strain of modern life, is fed up and restored for a time to his family and paternity. In our institutions we provide for the deaf-mute, the blind, the cripple, and render it relatively easy for the degenerate to leave their like."

The same sad and astonishing spectacle greets us with reference to our noble efforts to reduce the death rate among infants. This has been done with a result positively thrilling in its extent and grandeur; but, we meet with the astounding fact that by saving millions of infants who are inherently too weak to survive the further strains of life, we have directly increased enormously the death rate among the older children. Professor Ploetz has proved that every reduction in the infant rate has caused a rise in the death rate of children from two to ten in Germany, Professor Pearson and Mr. E. C. Snow proved it for England, and all evidence indicates that the same is true in the United States. Indeed, everywhere we turn, we face the startling truth that you cannot defeat nature, merely by putting her again in swaddling clothes. Prenatal culture has been tried since the time of Adam and Eve and it has been a failure. Prenatal care of the mother and careful nursing after birth is another matter. This is of surpassing importance. The mother should be calm, free from worry and overwork, and should make these months a period of joy and happiness. All this influences her nutrition, and helps to keep the babe well nourished. But that is not all. It helps to give the little fellow a proper start, and it is a pity that any babies should ever be born without such a happy prenatal beginning, for happy healthy childhood is the foundation upon which we must build the future. Our profession is seeking for a cure for pneumonia, tuberculosis, cancer, insanity, sclerosed arteries, hob-nail liver and abridged kidneys, yet, should a remedy be found for all these ills we will only have concealed instead of cured the weak spot in the human armor. If nothing else is done we will wreck the very race we have saved. In short, if by increased medical skill and by augmented state support and private charity, we enable the weaklings to survive and propagate their kind, undoubtedly, we shall have a weaker race. On the contrary, every biologist knows that without an eugenic policy as wide as society itself, civilization is self-destructive. After a generation of exact experimentation and study by the biologists and psychologists, we can now say that blood, that is, heredity, will always tell.

Christ said, "Men do not gather grapes from thorns, nor figs from thistles;" an earlier biblical affirmation is that, "Every living thing shall reproduce according to its own kind,—the weak shall beget the weak and the strong, the strong." The old prophets saw this as clear as day, only they didn't call it what we call it,—Eugenics.

People do not expect great speed horses to be born from draft horses, nor prize cattle from scrubs; but, when it comes to the human family many people honestly believe that good children will be born



from bad stock, quite as often as from good stock; that health will come out of weakness; or that while they are born weaklings education and training will put brains into their empty heads. They do not know that wooden heads are inherited, even if wooden legs are not.

We know that one may inherit immunity, or lack of immunity to certain infectious diseases; tuberculosis, pneumonia, typhoid, or influenza. Some individuals' blood or tissues furnish better soil for certain types of microorganisms than is furnished by the blood or tissues of their fellows. Some are immune to insect poisons, while others are very susceptible. Some people will be stung by bees upon the slightest provocation, while others can use them for playthings.

Certain diseases are known to be hereditary: epilepsy, myopia, cardiac-hypertrophy, colorblindness, cataract, Huntington's chorea, feeble-mindedness, multiple sclerosis, hereditary ataxia, coloboma of the iris, microphthalmus, hemorrhagic diathesis, polydactylism, orthodactyly, goiter, varicocele, varicose veins, asthma, fragility of bone, mitral insufficiency, idiocy. Not only diseases, but general physical characteristics, as stoutness, shortness, erectness, the Roosevelt smile, and the Hapsburg lip, may be inherited. Furthermore, the child may inherit temperamental traits, as temper, boisterousness, shyness, and specific musical talents. Fortunately our inheritance is not always a hindrance. We may take new cheer from the realization that children may also be endowed through heredity with great mental capacity. The understanding of all this had its origin in the epoch-making discovery of Gregor Johann Mendel, an abbot and biologist of Austrian birth (1822-84).

During eight years Mendel scientifically studied the pea plants in his monastery garden, until the closure of the monastery by the Austrian Government put an end to his experiments. The results of his observations and deductions therefrom were first read before a small company of his neighbors, and later published, in 1865. The importance of this discovery, known as Mendel's law, attracted no further attention until rediscovered by Hugo de Vries in 1900, when together with subsequent discoveries by a number of other scientists, the subdivisibility of each individual into many distinct units, or traits, was revealed, the hereditary sources of which were clearly traceable, leading to various individuals of the family line and not to one individual alone. Furthermore, it was found that the lack of a single trait sometimes appears as a trait itself, just as darkness appears to be a condition, rather than absence of light.

Although Sir Francis Galton, of England, who may be called the father of eugenics, had already started a movement for the conscious betterment of the human stock, out of these discoveries has arisen the real science of eugenics. They have changed the whole current of thought regarding heredity, and the constancy of its action, as well

as its controlability. They also emphasized the fact that it does make a difference whom one marries, if the character of the resulting offspring is to be considered. Their whole make-up is not subject to the caprice of forces beyond human perception, but is in some degree, subject to control.

Credit is due Professor Thomas Hunt Morgan, of Columbia University, for having added more to our knowledge of the germ cell than any man since Gregor Mendel. His work, together with that of his students, has lifted American experimental biology to a high plane in the scientific world.

#### MECHANISM OF HEREDITY

The sperm of every species of animal, or plant, carries a definite number of bodies called chromosomes. The egg carries the same number; consequently, when the sperm unites with the egg, the fertilized egg will contain the double number of chromosomes. For each chromosome contributed by the sperm there is a corresponding one contributed by the egg; that is, there are two chromosomes of each kind, which together constitute a pair. Every species of plant and animal has a certain definite number of these chromosomes in all its cells, both body-cells and reproductive cells. The number in some species is only two, while others have as high as two hundred. According to Professor E. B. Wilson, the veteran biologist, the ox, guinea pig, and onion, each has sixteen chromosomes in each cell; mice, salamanders and trout have twenty-four; monkeys have fifty-four; in the human cells there are forty-eight. Half the chromosomes have come from the mother and the remaining twenty-four from the father. "The chromosomes are the sole bearers of heredity." Each of these tiny particles bears its own particular and indivisible burden of life, as though it had been divinely appointed as the messenger of some Master Builder, who had some purpose of his own hidden beyond human ken. Each cell carries its own burden of life from out of the eternity of the past and hands it on to the greater eternity of the future. The chromosomes of this cell carry, it may be, the life of an ameba; the chromosomes of that cell may bear within them all the mighty genius of a poet, a philosopher, or a king. While they constantly vary and change, from causes and processes of which we know little, yet they are the most indestructible form of matter that we know. They move with all the mechanical precision of the planets; they divide and grow and sort themselves out in mendelian proportions and thus distribute the various characteristics of the ancestry among the descendants. "They are the most important things for their size in the whole world." (Woods.)

It seems necessary to recall to memory that these forty-eight chromosomes in the human being represent very probably the totality of

transmissible qualities which are to be imagined as localized in some way in these little bodies. It is impossible and surpasses the limits of natural science to try a more detailed explanation of this fact. But what is settled as a matter of fact in the general science of heredity is to be applied also to the human organism; furthermore, we have to remember that during the evolution of the whole organism from a single fertilized ovum, a part of every one of these latter enters at the same time into every new cell of the body. The marvelous mitotic cell division provides for the equal distribution of the chromosomal material as the fertilized ovum, from which our body originated. But this chromosomal material represents at the same time the potential power of specific differentiation of the cells, providing innumerable new cells and forming in this way the different parts of our body. The specific structure of the chromosomes with their potential power to bring about quite a specific differentiation of the cells and cell complexes is responsible for the characterization of the species, race, family, sex, and a great deal of the individual peculiarities which are potentially determined and fixed at the moment of fertilization. Every cell of the body receives the same amount of chromosomal material by the mitotic cell division, but the potential power to bring about quite a definite differentiation of the cells with quite definite and specific characteristics has become effective during the developmental process and has been used up to a different degree depending upon the different end state of the cells. We call the great number of different latent characteristics localized somewhere in the chromosomes unit-characters, or mendelian units, as they are transmitted to the descendants according to the rules of Gregor Mendel.

“What we assume to be the material substratum of those units must be present, therefore, in every body cell. The units responsible for the development of a particular body length, of a particular long nose, of musical endowment, or of red hair will be present in every cell of the body, but they will be effective in quite a different way in the different cells. The units for body length will manifest themselves in the cells of epiphyseal cartilages, the units for a long nose in the cells forming later the constituents of the nose, the units for musical talents in certain brain cells and the units for red hair in the cells producing hair pigment. In the remaining cells of the body all these different units remain inactive. Only in the germ cells do they keep their whole latent power undiminished, in order to manifest it when the germ cell happens to meet with a second germ cell of the other sex. We may speak of units as of chromosomal potencies, which are present in every cell, but become active only in a few special cell groups according to the kind of these units. In lower organisms where the power of regeneration is higher, or even complete, the presence of all units in every cell is quite obvious. The chromosomal potency representing the Mendelian units is the highest known, almost incomprehensible store of potential energy.”—(Julius Bauer.)

In the higher plants and animals when two cells unite from two parents at an early stage in cell division, a few cells are set aside at

the beginning of each individual's life. These are the reproductive cells. They remain unchanged, set aside in special organs, until the individual comes to maturity, when they begin to multiply and are by sex union combined with the cell from some other individual and thus a new generation of individuals comes upon the scene. The plant, or animal merely carries these germ cells through life and adds nothing to them in so far as we know, except nourishment, and takes nothing away. It is evident then that heredity, the portion set aside for reproducing the next generations, is one continuous stream. "The body dies, but the germ cells are immortal." The eggs, or germ cells which happen to be in any individual's body when it dies, of course, die with it and decay; but before it has died, if it has any progeny, it has handed on to its offspring a portion of this hereditary material carried in these chromosomes which it did not itself produce, but which it received from its parents, who in turn had received it from his parents back to the primal pair of living things. And so, on and on this stream of germ cells, which is the stream of life itself, flows unbroken throughout the succeeding generations. This stream of germ cells is never broken unless a whole species is wiped away. You ask what is to be done about this? Much is already being done; very much more can be done. I believe we are at least going to get rid of the feeble-minded, as it is a perfectly solvable problem. We have assumed that feeble-minded children came by divine intent, but they are evidently in the same class as side whiskers, they are just our own cussedness made visible, at least 80 per cent of them.

#### TREATMENT

Persuasion and education are the great eugenic agencies. Compulsion and legislation are very secondary. Thousands in this country have already been sterilized; consent being obtained mostly by persuasion. By using a lot of common sense with the public and a lot of entreaty with the feeble-minded, they have, in California, sterilized nearly 5000 without the law so far having been called in question. I think Judge Olson's idea of segregating the defective children while they are young and caring for them on large farms where they can be kept at the expense of the state for life, thus preventing any damage which they might do, by breeding or otherwise, is a good one. We could by means of segregation of the sexes for the criminally inclined, idiots, feeble-minded, epileptics, insane, etc., alone save the blood stream of our race from a tremendous amount of needless contamination. As for the worst types of human defectives, they will probably fail to produce anyway. The ideal way to treat defective children, however, is to start several generations before they are born and prevent their arrival upon the scene, rather than cure, or kill them. Much good can be accomplished by inculcating in our young boys and

girls the higher ideals along eugenic lines, by proper teaching at school, at home and abroad. A further knowledge of heredity in the marriageable young, augments an already developed wisdom in mate choosing. It unconsciously and favorably modifies the individual taste. What the physical, mental and moral caste of the races of the future shall be, depends largely upon the action of those upon the earth at present, who are now making their choice in marriage.

When we propose to restrict marriages, or mating of those unfit to marry, people are apt to say, "That is a dream, it can't be done." But it can be done and it has been done. We all know of the cretin in Switzerland, a kind of idiot, short in stature and afflicted in all cases with goiter, frequently helpless in childhood. A gentleman very much interested in eugenics, visited Aosta, in Italy, just outside Switzerland, once in 1900, and again in 1910. In 1900, he found many of these dwarfs among the beggars in the streets, in the asylums, in the home; but in 1910, he found only one! What had happened? A few resolute, intelligent reformers had changed the entire situation. Isolation institutions, one for the men, the other for the women, were established. In these the best care of the inmates was taken as long as they lived, and such people do not live long. Thus it is possible to apply the laws of heredity as laid down by Mendel in a thoroughly practical way and to get results immediately in one short generation. It seems, and it is, a colossal task to change average human nature one iota. Yet in the light of modern eugenics we could make a new human race in a hundred years, if only people in positions of power and influence would wake up to the paramount importance of what eugenics means.

There are seven main lines along which eugenic improvement of the race may be obtained. (1) Education of all people on the inheritability of traits and the consequent development of higher and more intelligent ideals of marriage. (2) Segregation of defectives, so that they may not mingle their family traits with those on sound lines. (3) Sterilization of certain gross and hopeless defectives, to preclude the propagation of their type. (4) Marriage laws consonant with the principles of eugenics. (5) Selective immigration laws to stop the dumping of European institutions for defectives, delinquents, etc., on America. (6) The abolition of war, which systematically destroys those best fitted to be progenitors of the future human race, young men medically selected as the strongest and soundest. (7) The conversion of "birth control" now acting dysgenically into a eugenic agency to increase the birth rate of the fit and decrease that of the unfit.

"There would seem to be great need of State Eugenic Boards, to correlate and to promote these activities, in the interest of the future population, and to give expert advice as to how to mate wisely." (Fisher and Fisk.) Some people have little faith in what can be ac-

complished by this sort of education, but let us consider the amazing thing that has happened in educating people about another great discovery of science,—the discovery of microbes. The education of the people about microbes is one of the most spectacular things in all history. A generation ago, microbes were just as mysterious to the public as germ cells and chromosomes are today, yet every child knows about microbes today. "They have changed the architecture of our houses, the kind of clothes we wear, the sort of food we eat. They have changed our school books, our morals and habits, even our religion." (Wiggam.) Notwithstanding all this, indeed because of all this, I predict that within another generation we shall see cities and nations setting aside "Germ cell week," "Heredity week," and "Race improvement week." The States of Michigan and Kansas have already approached this in their famous "Fitter Families Contest," at their annual State Fairs. We shall, I think, ere long see even longer processions carrying banners with such inscriptions as: "Insanity, Epilepsy, Pauperism, and Feeble-mindedness, are mainly caused by bad germ cells"—"Crime is largely due to bad germ cells"—"Tuberculosis is chiefly caused by unwise marriages"—"Clean up your family germ cells and help produce a better race."

Heredity is man's best friend. Pearson has proved that heredity is five times as important in causing health and disease as microbes, or any environmental factor. Though the public may not be impressed by a study of eugenics in the abstract, teaching the practical side of heredity will obtain its interest. For instance, it is reported that in the past generation all crime in the State of Indiana has come from about one hundred families. In several of our states from one-third to one-half of the taxes go to the care of the unfit. When the average man learns that he is spending an enormous portion of his wages to insure his family against disease, when a wise marriage would have given him this insurance free of charge, he is bound to be impressed.

Finally: The best treatment for the "Developmentally Unfit Infant," is well illustrated in the wonderful play of Maeterlinck's called the "Bluebird," in which we are taken to the "land before birth" where the children are waiting to be born, having selected their parents to be; or like the advice of Oliver Wendell Holmes to children to choose good grandparents.

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*NOTE.*—As this issue of the Journal is devoted to the Transactions of the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, it was found necessary to omit the current installments of the usual departments. The publication of the latter will be resumed in the May issue.

# The American Journal of Obstetrics and Gynecology

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## Original Communications

### CLINICAL AND EXPERIMENTAL STUDIES ON THE TOXEMIAS OF PREGNANCY\*

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BEFORE considering experimental data relating to the toxemias of pregnancy, it may be well to have before us a classification of these disorders of gravidity. With this in mind, I am submitting a classification which has been the outcome of a detailed study of the findings in 120 patients, suffering from a toxemia of the latter half of pregnancy, and in whom we had the opportunity to observe and record the findings in repeated pregnancies. The clinical and laboratory observations, on which this classification is based, have already been reported in detail,<sup>1</sup> and so only the final groupings are here given.

#### CLASSIFICATION OF TOXEMIAS

The evidence adduced suggests that the late toxemias of pregnancy may be classified as follows:

1. Eclampsia.
2. Preeclampsia.
3. Chronic nephritis, complicating pregnancy.
4. Eclampsia superimposed upon nephritis.
5. Low reserve kidney.

Some explanatory remarks may here be necessary. Eclampsia is a fairly definite entity and needs no further comments as to its classification. I believe that preeclampsia differs from eclampsia only in

\*Read at a meeting of the Brooklyn Gynecological Society, November 5, 1926.

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

See page 675.



so far as the patient has no convulsions or coma, and that the disease may be of a milder type. The incidence of preeclampsia is below 5

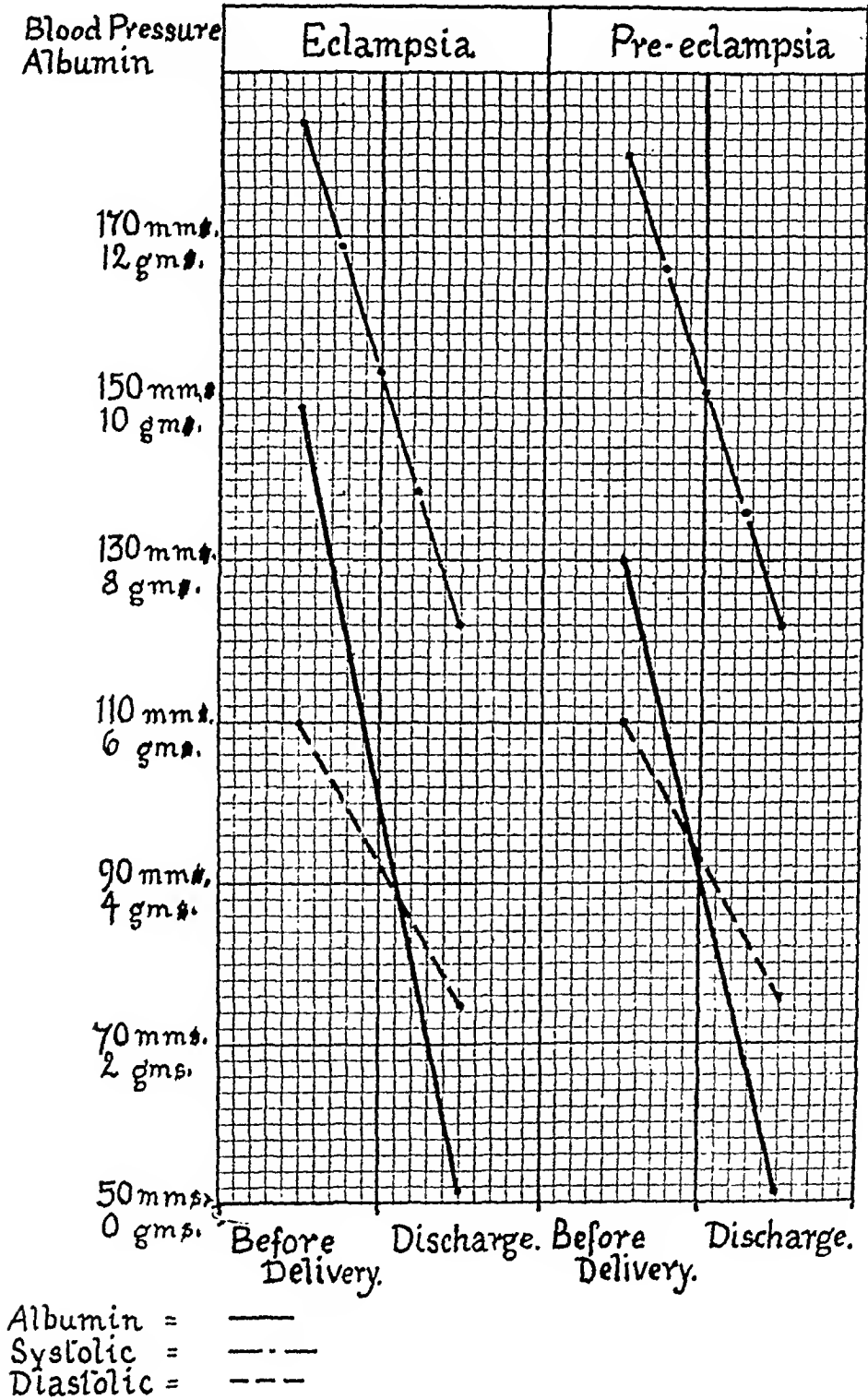


Fig. 1.

per cent of all toxemias and it is probably just what the term implies, a stage immediately preceding eclampsia. I prefer the term "pre-

eclampsia" to that rather loosely used phrase "preeclamptic toxemia." It may be well to discontinue the use of this latter designation.

In order to show the marked similarity between eclampsia and preeclampsia, the systolic and diastolic blood pressures and the amount of albumin in the urine have been graphically recorded in Fig. 1. The findings before delivery, when the patient is at her worst, and on the day of discharge from the hospital, at the end of the puerperium, are noted. Even a casual study of this chart convinces one of the remark-

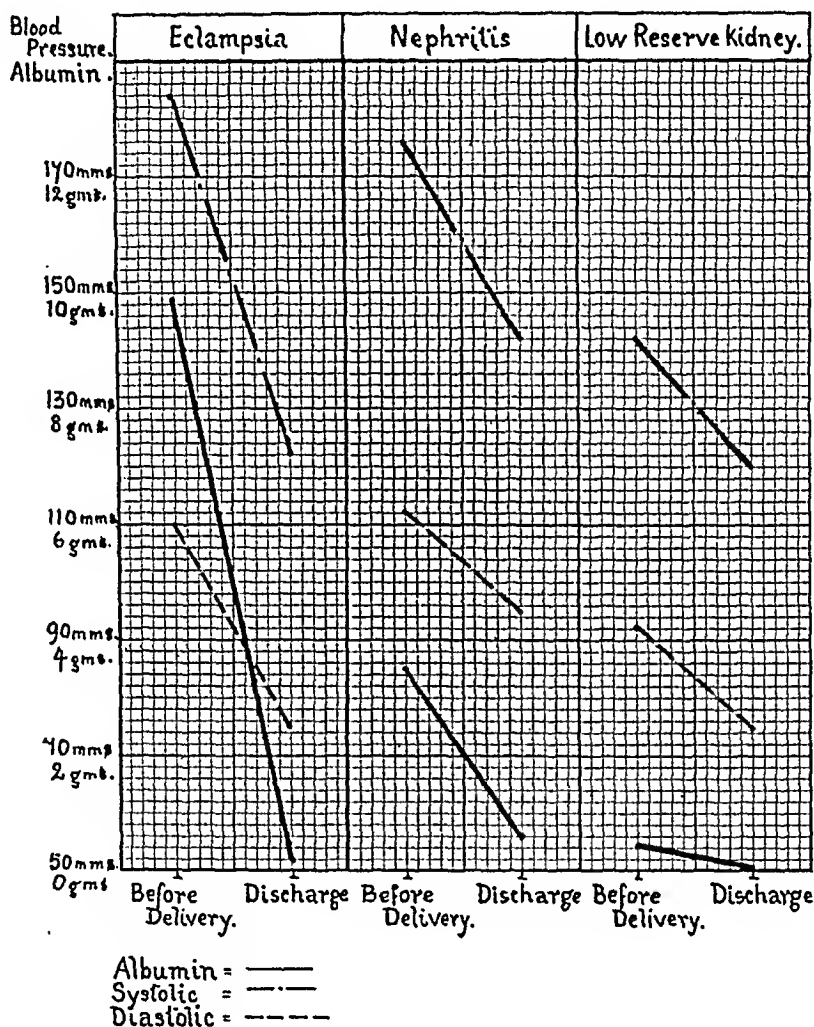


Fig. 2.

able similarity between eclampsia and preeclampsia. It seems quite justifiable to predict that should the condition in preeclampsia grow slightly worse, the patient will develop convulsions, and so have true eclampsia.

In chronic nephritis complicating pregnancy the process is progressive, because here we have to contend with renal impairment. Before discussing the differential diagnosis between the different types of toxemia, let us first consider the low reserve kidney. The evidence is quite convincing that there is a type of patient in whom the kidney

reserve is too low to meet the extra demands of pregnancy, and this is manifested by a small amount of albumin passing through the glomerular epithelium as well as by a slight rise of blood pressure. The kidney substance is not damaged by the pregnancy and in a subsequent pregnancy the signs of the toxemia, if we may call it that, are not any worse. Pregnancy does not injure this type of kidney and in a succeeding pregnancy the patient may show no signs of a toxemia or only a disturbance similar to that first noted.

As the group "eclampsia superimposed upon nephritis" is simply a combination of eclampsia and chronic nephritis (and this is a very rare type of toxemia), and as we have seen that preeclampsia is only the stage immediately preceding eclampsia, we may now consider the three main groups. These are:

1. Eclampsia.
2. Nephritis complicating pregnancy.
3. Low reserve kidney.

In order to present the marked dissimilarity between these three types of toxemia, I have prepared the graph shown in Fig. 2. It will be readily seen that in eclampsia the patient usually has a marked elevation of both systolic and diastolic blood pressure, as well as a large amount of albumin in the urine. All these abnormal findings disappear during the puerperium. This is not the case in chronic nephritis complicating pregnancy, because in this instance the patient has a persistent albuminuria, high systolic and, particularly, a high diastolic blood pressure, lasting beyond the puerperium. The patient with a low reserve kidney has only a mild disturbance of blood pressure and a slight amount of albumin in the urine and at the end of the puerperium these have completely disappeared. Chronic nephritis in pregnancy may be regarded as a purely medical condition and one in which the extra load of each succeeding pregnancy leads to progressive kidney damage. On the contrary, when we are sure that a toxemia is due to a low reserve kidney, we need feel no alarm concerning subsequent pregnancies. We may now consider the problem of eclampsia, which is a definite, separate entity.

#### BLOOD CHEMISTRY IN ECLAMPSIA

From a large series of blood analyses, conducted during the past four years, we have been able to detect certain very definite changes in eclampsia.<sup>2</sup> The results of these determinations on eclamptic blood may be summed up as follows:

1. The cation ratios are within normal limits, with the possible exception of the  $\frac{(P)}{(Ca)}$  ratio, which is slightly elevated.
2. A high uric acid content.

3. An increased lactic acid, not wholly due to muscular hyperactivity.
4. A tendency towards a hyperglycemia.
5. A decreased  $\text{CO}_2$ -combining power, which is very pronounced in certain cases.
6. Usually no increase in the nonprotein nitrogen, but sometimes a definite increase in the urea nitrogen.

The outstanding changes are shown in Fig. 3, where, for the sake of comparison, I give the values for normal pregnancy, for eclampsia before delivery or improvement, and for eclampsia at the end of the puerperium, when the patient is completely recovered. At present we

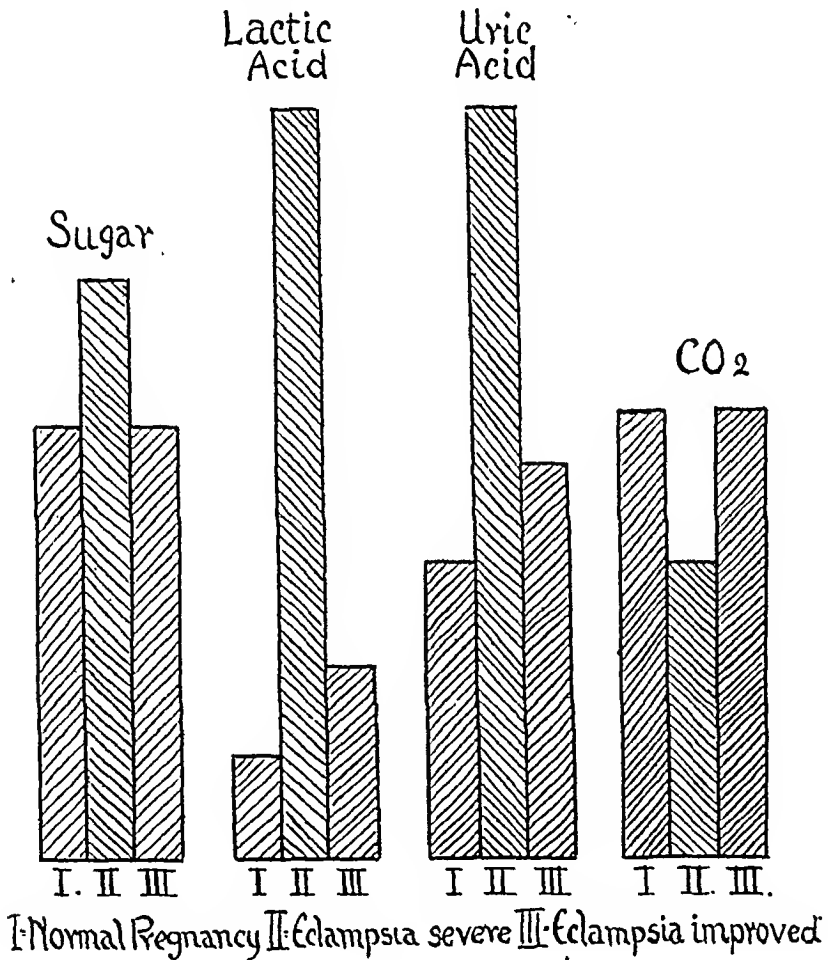


Fig. 3.

are not in a position to say how far this blood picture in eclampsia is due to liver change, and it is perhaps wise not to theorize until further evidence is at our disposal.

#### ECLAMPSIA AND ANESTHESIA

During the past year we studied the effect of anesthesia on the blood constituents, as well as on the histology of the different organs, in animals. For this purpose fifty healthy, normal dogs were utilized. The details of these experiments have already been reported.<sup>3</sup> Nitrous

oxide, ether, chloroform, and ethylene were the anesthetics employed. The results with these different substances were strikingly similar, all producing about the same changes in the blood chemistry as well as in the histologic architecture of the liver. The changes observed in the blood constituents were:

1. A lowering of the  $\text{CO}_2$ -combining power.
2. A hyperglycemia.
3. An increase in lactic acid.
4. A slight increase in uric acid.
5. A slight increase in inorganic phosphorus.
6. No or very little disturbance in the nonprotein and urea nitrogen.

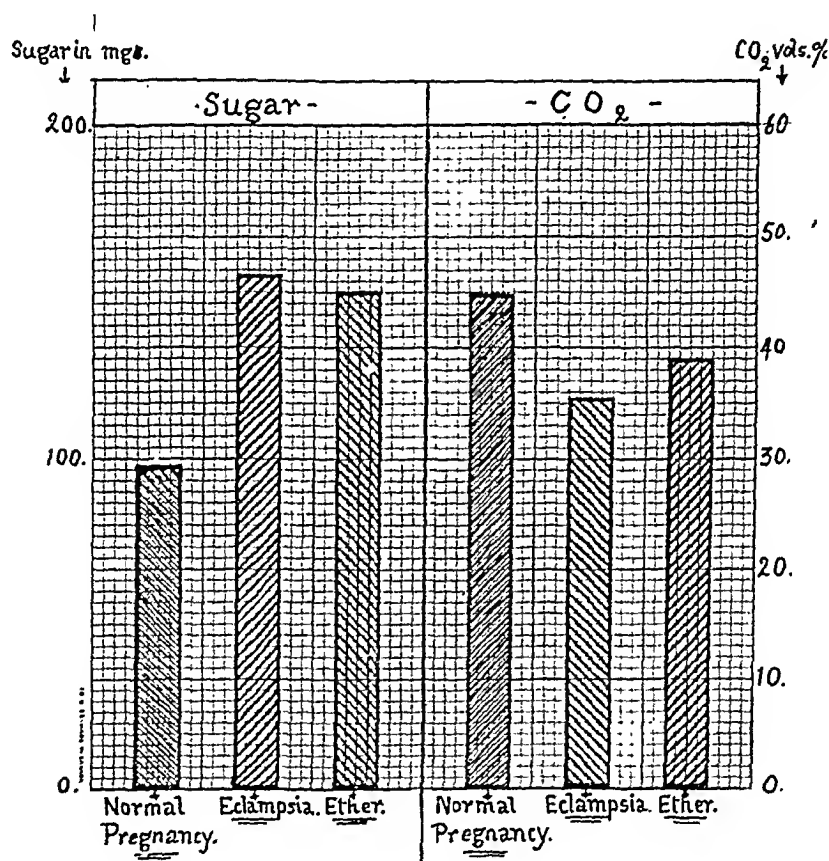


Fig. 4.

It will readily be seen that this blood picture is almost identical with that found in eclampsia. The values for blood sugar and  $\text{CO}_2$ -combining power are shown in Fig. 4. As the changes in these blood constituents under the influence of the different general anesthetics are very similar, I have chosen only the ether figures to compare with the values for normal pregnancy and for eclampsia. We may confidently say that ether, chloroform, nitrous oxide, and ethylene produce changes in the blood constituents very similar to those seen in eclampsia, and from our histologic studies that these anesthetics also produce pronounced liver lesions as well as changes in the kidneys.

## ECLAMPSIA AND HISTAMINE

Since there has recently appeared<sup>1</sup> some histologic evidence suggesting histamine as the etiologic factor in the production of eclampsia, I have conducted a series of experiments with histamine, as well as with peptone and histamine-free albumose. A study was made of the blood changes and of the pathologic lesions following the use of these substances. The details of these experiments and the chemical and pathologic findings have been reported.<sup>2</sup> The conclusions reached were as follows:

1. Peptone, histamine, and histamine-free albumose each produces a blood picture suggesting an anhydremia. The moisture content of the blood is lowered, although the increased concentration of the blood is perhaps not wholly due to this dehydration process, but also to actual loss of plasma resulting from capillary dilatation. It should be noted here that in eclampsia the moisture content of the blood is not lowered, but, on the contrary, is slightly increased.

2. Identical pathologic changes in the liver and kidney follow the use of peptone, histamine, and albumose, but these changes bear no likeness to those observed in eclampsia. These substances produce marked degenerative changes in the liver, involving the greater part of the lobule, leaving free only a rim of normal cells about its periphery, so that it is, strictly speaking, a central necrosis; whereas in eclampsia there is a typical peripheral necrosis.

3. The evidence so far obtained makes it improbable that either histamine or albumose is to be regarded as an etiologic factor in the causation of eclampsia.

## ECLAMPSIA AND ANOXEMIA

During the course of the experiments with general anesthesia, the idea suggested itself that one perhaps had to deal with varying degrees of asphyxia. From a consideration of the chemical findings in the blood of an eclamptic woman it also appeared that one may be here dealing with the results of deficient oxidation. By allowing an animal to breathe an atmosphere low in oxygen it is possible to study the effect of anoxemia on the blood constituents. I have found that an atmosphere containing 7 per cent oxygen is most satisfactory for this particular work. The investigations in anoxemia taught us that in experiments with general anesthetics one should be careful to eliminate the effect of asphyxia and that in eclampsia it is probable that deficient oxidation may play an important rôle. Anoxemia produces an acidosis, as is evidenced by a lowering of the  $\text{CO}_2$ -combining power, a hyperglycemia, and an accumulation of lactic acid in the blood stream. Breathing an atmosphere scanty in oxygen, also brings about marked degeneration and necrosis of cells in all parts of the

liver lobule, as well as slighter changes in the convoluted tubules of the kidney. These changes are not associated with the deposition of fat, but appear to be simple necrosis of cells. It seems plausible that any theory which is to explain the etiology of eclampsia, will have to be linked up in some way or other with deficient oxidation.

#### TREATMENT OF ECLAMPSIA

Views on the treatment of eclampsia are constantly changing and it is indeed well that such is the case, for until we know the true etiology of this dreaded disease, our treatment must remain empiric; and while such a condition of affairs exists it is by the trial and error method that valuable knowledge is gained. It should be strongly emphasized, however, that we are too often prone to draw conclusions regarding a particular treatment after having given it an inadequate trial. This is especially true when beneficial results have been obtained, but sometimes it applies also to the reverse. This may be explained on the ground that it requires a long period of observation and study to evaluate correctly any treatment on a large enough series of eclamptic patients.

For a true estimation of the progress obtained in the treatment of eclampsia during the past forty years, it is essential that one have no preconceived ideas and maintains an open mind. It is, indeed, somewhat disconcerting on visiting the different leading obstetric clinics in this country and Europe to find such conflicting ideas regarding this subject. One is immediately struck by the observation that many leaders in this branch of medicine condemn methods of treatment which they themselves have given no real test and with which they are not well acquainted.

A study of the different methods of treatment and experimental investigations on certain of the substances advocated has led to some surprising deductions.

*Morphia.*—It is many years ago that morphia was first suggested as a means of treating eclampsia, and today it is embodied in several of the well-known methods. To withstand the test of time, it is probable that there must be something beneficial in the use of this drug in combating the disease. It was with this in mind that the effect of morphia was studied. An analysis of the blood constituents and a histologic examination of the liver and kidneys in dogs morphinized to the extent of profound sleep, revealed striking results. This drug raised the carbon dioxide combining power from about 55 volumes per cent to approximately 70 volumes per cent and, furthermore, had no anatomic effect on the tissues studied. As pointed out above, there is an acidosis accompanying eclampsia, and this may be a reason for the good effect of morphia on the eclamptic patient. It should be stated that out of eight hypnotics examined, only morphia definitely

raised the  $\text{CO}_2$ -combining power. Unknowingly, then, a sedative has been selected which is capable of combating, in part at least, the acidosis of eclampsia.

*Magnesium Sulphate.*—During the past year magnesium sulphate has been suggested for treating the convulsions of eclampsia.<sup>5</sup> I have accordingly studied the effect of this substance on the blood constituents and various tissues in dogs. The magnesium sulphate was injected

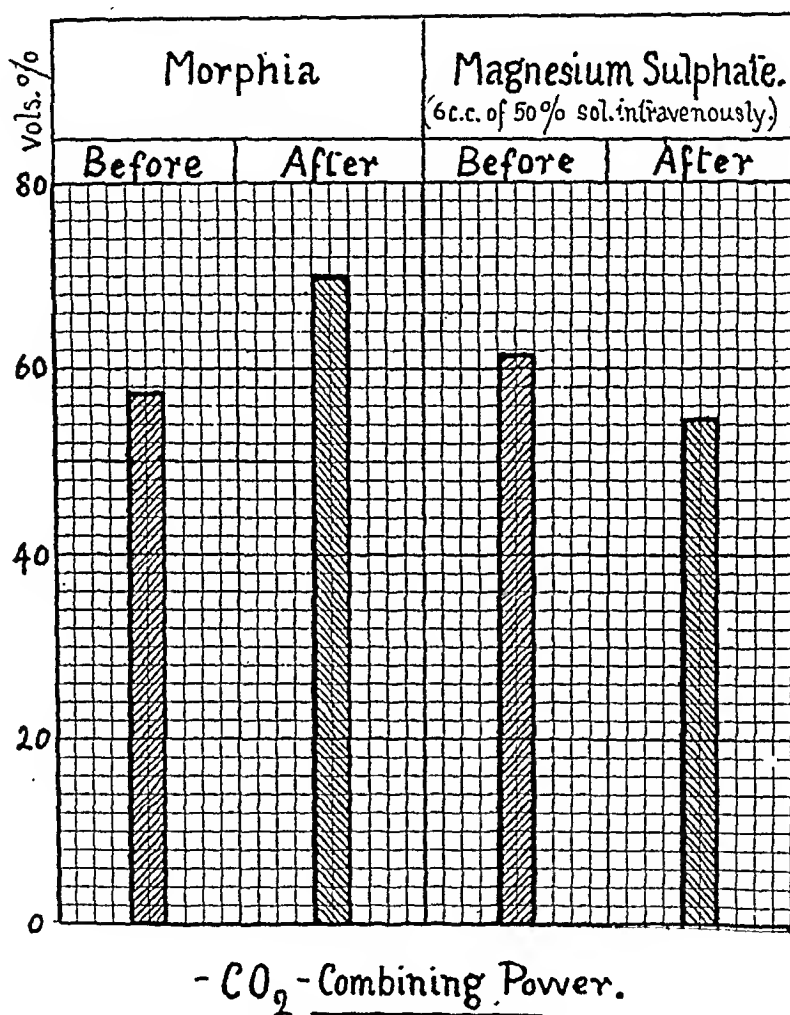


Fig. 5.

both intravenously and subcutaneously in amounts per kilogram of body weight corresponding to that advised for the treatment of the eclamptic fits. This chemical produced a lowering of the  $\text{CO}_2$ -combining power and a slight increase in the blood sugar, as well as very marked fatty changes in the liver. From these experiments, admittedly too few to allow definite conclusions, it appears that magnesium sulphate may do harm in eclampsia. It certainly seems advisable that further studies on this substance be conducted, before one advocates its use in a condition where there is an existing acidosis and an



already damaged liver. The columns in Fig. 5 clearly demonstrate how morphia differs from magnesium sulphate in its effect on the  $\text{CO}_2$ -combining power of the blood.

*Venesection.*—There are conflicting ideas regarding the value of bleeding in eclampsia. I have endeavored to evaluate, in an unbiased manner, the results obtained with and without venesection. In such a search it is, of course, necessary that the rest of the treatment in both series remain the same and that the series be fairly comparable as to severity and duration. One reaches the conclusion that it is very improbable that bleeding can be of material aid in the treatment, but sometimes it may do harm. The high diastolic blood pressure in eclampsia may be a protective mechanism, essential to elimination. We have all noticed how quickly the blood pressure in this disease returns to its high level after a venesection. Furthermore, a consideration of the normal blood volume and amount of tissue fluid suggests that a venesection of 500 to 750 c.c. can be of no material value in the elimination of "toxins."

*General Anesthesia.*—As stated above, ether, chloroform, nitrous oxide, and ethylene produce changes in the blood constituents very similar to those associated with eclampsia. They are also responsible for injury to the liver. The chemical and pathologic findings with general anesthesia, therefore, indicate that the eclamptic patient should not be subjected to a general anesthesia. Furthermore, it does not seem illogical to assume that the marked reduction in maternal mortality which followed the change from radical to conservative treatment<sup>6</sup> is due, in part at least, to the fact that it carried with it a far more restricted use of general anesthesia.

*Local and Spinal Anesthesia.*—In experiments with novocaine or procaine, injected subcutaneously, I have been unable to detect any changes in the blood constituents due to the anesthesia. A very large dose of procaine (20 c.c. of a 2 per cent solution) has no effect on the  $\text{CO}_2$ -combining power, sugar, lactic acid, uric acid, inorganic phosphorus, nonprotein nitrogen or urea nitrogen of the blood. It follows that the use of such a local anesthetic would probably be quite safe in eclampsia. It may be advisable in certain of the severe types of eclampsia to end the pregnancy under local or spinal anesthesia, and we are at present attempting to ascertain in the severe cases what results will follow prompt delivery under spinal anesthesia.

*Insulin.*—Following the work of Thalhimer<sup>7</sup> on the effect of insulin on postoperative acidosis, we investigated its effect on the acidosis of eclampsia.<sup>2</sup> In a certain type of eclampsia the acidosis is the most outstanding finding, the  $\text{CO}_2$ -combining power sometimes dropping to values below 15 volumes per cent. In such cases I am of the opinion that death is due to the marked acidosis, for we are all acquainted

with the narrow limitations of the hydrogen-ion concentration of the normal blood. Deepened breathing, excretion of acid urine, and increased excretion of ammonia are not of much avail to compensate for an acidosis where the  $\text{CO}_2$ -combining power has fallen to such low levels. If compensation fails, coma is the result. It seems, therefore, that it is highly imperative that these patients, with such strikingly low  $\text{CO}_2$  values, be given treatment to combat the acidosis. Insulin, with a protective dose of glucose, approximately 2 grams per unit of insulin, has proved to be satisfactory therapy in such cases. We are, however, carrying on more extended work on the hydrogen-ion concentration in eclampsia with the hope of gaining information that may help us further in the treatment of this phase of the disease.

*Present Treatment.*—Two years ago we put into effect in the Johns Hopkins Hospital a modified Stroganoff treatment for eclampsia,<sup>9</sup> after I had had an opportunity to study, in Russia, the results of this method. The original Stroganoff method includes chloroform and venesection, and both of these steps in the treatment I believe to be unnecessary and perhaps even harmful.

As a result of our experience of the past two years with this modified Stroganoff method, and in view of the experimental findings reported above, we are at present virtually dividing our cases of eclampsia into two groups, mild and severe, following Eden's classification. The patients with mild eclampsia receive the modified Stroganoff treatment, because we have found that it reduced the maternal mortality in this group to below 2 per cent.<sup>10</sup> In the severe type, a better method of treatment is urgently needed, and so we have decided to attempt prompt delivery under spinal anesthesia. We are not yet in a position to say what results will follow this rather radical departure in our procedure of treatment of the severe type of eclampsia, although the experimental evidence lends strength to the opinion that the maternal and fetal mortality will be reduced.

In all eclamptic patients it is highly essential that we know the amount of alkali reserve in the blood, for should a marked acidosis develop, it is imperative that therapy be instituted to combat the alkali deficit. We, accordingly, do a blood analysis on each eclamptic patient as soon as she enters the hospital and further determine the  $\text{CO}_2$ -combining power of her blood every two hours thereafter, or whenever coma persists. Should the  $\text{CO}_2$  fall to below 30 volumes per cent, the patient is given from 15 to 30 units of insulin with a protective dose of glucose in order to treat the acidosis. It is to be understood that this insulin therapy is instituted only to relieve the condition of lowered alkali reserve and does not interfere with the other steps of the treatment.

## VOMITING OF PREGNANCY

I have given a brief résumé of the work we have done on the toxemias of the latter half of pregnancy, and it is perhaps fitting that a few remarks be made on the toxemia of the first half of pregnancy. Vomiting of pregnancy occurs during the first five months of gravidity, and I prefer to regard it as a toxemia, believing that there is no such entity as true neurotic vomiting, although the neurasthenias or neuroses, so common in women, may play a very important rôle in this disorder of pregnancy. It is more than probable that there is always an organic or metabolic disturbance which forms the main basis for the vomiting.

There is already sufficient experimental evidence at hand to show that the mother must undergo a profound change in metabolism during pregnancy. From the work of Porges and Novaek<sup>11</sup> we know that there is a definite tendency towards acetonuria in normal pregnancy. Low carbohydrate diet as well as starvation leads to acetone bodies in the urine. A special diet low in carbohydrate produces acetonuria in pregnancy, whereas it fails to do so in normal non-pregnant individuals. We have acetonuria whenever the liver has lost its glycogen and has to draw on fats and proteins for the formation of carbohydrate, or whenever there is deficient oxidation of fats.

When we now consider that the fetus probably utilizes only protein and carbohydrate from the mother's blood and that it builds its own fat from the carbohydrate which came from the mother, we shall readily see that there is a drain on the maternal carbohydrates. This view has been further substantiated by work on the respiratory exchange of the fetus. I have found that in the human fetus at term the respiratory quotient is approximately unity, signifying that the child uses carbohydrates mainly for its energy requirements<sup>12</sup>; and others<sup>13</sup> have also shown this to be the case in certain animals. We, furthermore, have analyses<sup>14</sup> on maternal and fetal blood during the latter part of pregnancy, which reveal an accumulation of total fat in the mother's blood, and an unequal concentration of lipoids in the maternal and fetal circulations.

All this evidence leads to the conclusion that fats do not pass the placental membrane from mother to child, that the fetus utilizes mainly carbohydrates and that there is a consequent drain on the carbohydrates of the mother. This leads to a tendency towards acetonuria in normal pregnancy and to the so-called "acidosis of pregnancy." In normal pregnancy, then, the mother has to change her metabolism to suit her offspring and the greater part of this change is perhaps instituted between the second and fourth months. Further work is necessary to prove conclusively that the vomiting of pregnancy is dependent

on this change in metabolism, although the evidence so far adduced makes it highly probable.

It is perhaps because of this drain on the maternal carbohydrates that glueose has been found to be of some benefit in the treatment of vomiting of pregnancy.<sup>15</sup> We have had some success with glueose, as well as with insulin and glucose, in the treatment of this disorder, but we have also had cases where all attempts at treatment were futile. I believe, however, that as we gain more information regarding the metabolism of mother and child, we shall be able to cope more intelligently with this metabolic toxemia of pregnancy.

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(For discussion see page 656.)

#### SYNCYTIAL ENDOMETRITIS AND SYNCYTIOMA\*

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THE term "syneytial endometritis" was first employed by Ewing<sup>7</sup> to replace Marchand's<sup>15</sup> "atypical chorioepithelioma" which the latter used to designate one main type of *malignant* chorioepithelioma. It may be defined as an excessive infiltration of the endometrium and uterine musculature with the syncytial cells of the chorionic villi. There is usually an accompanying leucocytic exudate. Since the lesion as it is looked upon today is not a malignant one, Marchand's nomenclature becomes inappropriate and misleading. Further, the term "syneytial endometritis" is more descriptive of the histologic findings. When the syncytial elements occur in larger masses or sheets rather than as isolated cells the neoplastic is approached and the term "syncytioma" is more suitable.

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A review of the literature of the past fifteen years reveals but few case reports of either of these conditions, yet, one finds here and there cases recorded as chorioepithelioma which on analysis prove to be syncytial in character or proliferating hydatid moles. An insufficient appreciation of the existence of these transitional lesions may be held responsible for the erroneous conceptions regarding the nature of the highly malignant chorioepithelioma.

Since these lesions (exclusive of the teratomas) always arise in connection with a pregnancy, an abortion, or a mole, it is well at this point to review briefly the structure and physiology of the chorionic epithelium. As a result of the studies of Marchand, Teacher, Bryce, Spee, Langhans and others, it is an accepted fact that the epithelial elements of the chorionic villi, namely, the syncytial and Langhans cells, are both of fetal origin. When Marchand's first paper on chorioepithelioma was published, it was thought that only the cell layer (Langhans layer) was of fetal origin and the syncytium a maternal derivative. The Langhans cells we may recall compose the inner layer of the villus and are cuboidal or polygonal in shape with clear cytoplasm and large vesicular nuclei. The syncytial layer forms the outer covering and is actually a syncytium or sheath. It appears as an acidophilic band of more or less vacuolated protoplasm with no definite cell boundaries and as isolated mono- and multi-nucleated giant cells, the so-called wandering cells. The central core of the villus is composed of a loose connective tissue stroma. In the first three or four months of pregnancy both epithelial layers are present in about equal proportions. The Langhans cells then begin to diminish in number so that in the latter half of pregnancy there exists for the most part only the syncytium. The physiology of the wandering syncytial cells in pregnancy is unique. We know that it is not uncommon to find these large wandering cells in moderate numbers in the uterine musculature and veins and even in the pulmonary veins in normal pregnant states. Schmorl<sup>24</sup> has found these detached cells in the pulmonary veins in 80 per cent of 150 eclampsics studied at autopsy.

Thus it is seen that the syncytial cells display an invasiveness that may be likened to malignant cells, infiltrating the decidua and muscularis and eroding and gaining entrance to the blood vessels. The similarity of the fetal trophoblast to malignant tissue is further noted in its high lecithin content and in its selective action for lead. Bell<sup>1</sup> quotes the work of Bullock and Cramer<sup>2</sup> who showed this chemical similarity of embryonal tissues to the embryonal cells of malignant growths; the selective affinity of embryonal cells for lead is an observation of Bell and on this principle he has worked out his theory of lead treatment for cancer. We have, therefore, in the behavior of the normal trophoblast histologic, physiologic, and chemical points of resemblance to malignant growths, namely, local

invasion, rapid growth, high lecithin content, dissemination or systemic invasion by the syncytial cells, and one might add another, the heterotopic growth potentiality of the whole trophoblast as we see it in the nidation and development of ectopic gestation. Apparently there exists in pregnancy a mechanism which in the vast majority of instances restrains attempts at autonomous trophoblastic growth. Veit and Schoen, quoted by Bland,<sup>3</sup> have suggested that there is present a syncytiolysin in the body which is the growth restraining factor that checks the invasion of the rapidly growing embryonal tissue. O. Frankl<sup>11</sup> mentions the work of others as well as his own, bringing out the fact that the serum of normal pregnant women has the power to dissolve fetal cells (placenta, liver, kidney) in vitro. Adult cells are not so affected. Further, Frankl using the serum of three patients who had chorioepithelioma, was unable to demonstrate this solvent property towards embryonal cells. Frankl feels that a syncytiolysin actually exists.

It is generally recognized that bilateral cystic changes in the ovaries are found in from 80 to 90 per cent of cases of chorioepithelioma and mole formation and it has been suggested by some that a disturbed lutein function may be the causative factor of the proliferative process.

One might entertain the hypothesis that in cases of syncytial endometritis and syncytioma this growth restraining mechanism is only slightly impaired. It is also possible that actively proliferating Langhans cells by their presence in some manner enhance the invasiveness of the syncytium, for it has been shown (Pels-Leusden, Meyer) in normal pregnancy the syncytial invasion is greatest in the early months and may be completely missing in the full-term uterus. The Langhans cells, as has been stated, are present mainly in the first half of pregnancy and are usually absent in the placenta at term; it is evident that the need for the invading and anchoring properties of the trophoblast is greatest in the early period of gestation. Furthermore, the anaplastic Langhans cells are a specific feature of the highly malignant chorioepithelioma; therefore their absence in the syncytial lesions is of paramount significance.

Syncytial endometritis is not a tumor process. It is essentially a more or less unrestrained invasion or infiltration of the uterine tissues with isolated syncytial cells. The syncytial cells vary in the amount and the extent of their invasion. Thus in one instance the invasion may be limited to the decidua and subjacent myometrium, and in another it may extend to the serosa. The question naturally arises as to how we can differentiate between physiologic and pathologic syncytial invasion. Proust and Bender<sup>23</sup> answer this by taking up the suggestion of Brindeau and Nattan-Larrier.<sup>4</sup> The latter authors in differentiating between normal and neoplastic syncytial infiltration

maintain that in tumor processes the integrity of the maternal tissues is not respected. They believe that a musculotoxic substance is secreted by the syncytial cells which acts on the muscle cells in their vicinity causing hyaline degeneration with protoplasmic rarefaction and nuclear changes. They also add that under physiologic conditions the syncytial cells merely pass through the vessel walls, whereas in pathologic processes there is destruction of the vessel walls with the formation of hemorrhagic areas. Regardless of the validity of their theory, it remains that these histologic observations coincide with the picture seen in syncytial endometritis, but these authors fail to consider the benign character of the syncytial lesions.

Nothing definite can be said regarding the etiology of syncytial endometritis. In view of what has been stated in the introductory paragraphs I am inclined to believe that the causative factor is systemic rather than of local origin in the uterus. It is felt that the clinical events seen in connection with adherent placenta, abortion, and mole formation (conditions in which syncytial endometritis occurs) are the result rather than the cause of the excessive epithelial activity. In the case which will be reported below, the process occurred in a patient married only six months and with no history or evidence of any previous uterine disorder. The interesting experiments mentioned above concerning the activity of the blood serum of pregnant women makes me feel that there are quantitative variations of this peculiar property. In pathologic processes, therefore, the histologic picture would be governed accordingly. This is speculation however.

As for the symptomatology, it may be said that there is nothing characteristic. The chief clinical feature is bleeding, in connection with a pregnancy or abortion, or following the expulsion of a hydatid mole. The bleeding is progressive and may produce a marked secondary anemia. The diagnosis is definitely made from the examination of the curettings or discharged tissue. There may be embolic manifestations in the pulmonary veins giving cough and hemoptysis, or emboli may occur in the vaginal veins. These embolic phenomena are apt to suggest true metastases, but the syncytial cells are not known to show progressive proliferative tendencies. Ewing's patient had a cough and hemoptysis. McClellan's<sup>16</sup> patient who recovered, also had bloody expectoration following a sudden sharp left thoracic pain, and syncytial cells were demonstrated in the sputum.

The size of the uterus is variable. In addition to the specific cellular structure of this process, there is present a considerable amount of coagulated blood, some necrotic tissue, and an interstitial leucocytic exudate. The bulky size of the uterus is often dependent on these features. The stage of the gestation during which the disease began, or the extent of the mole formation if occurring with this process, or

retarded involution are additional factors on which the size of the uterus will depend. In Cullen's<sup>5</sup> case the uterus was the size of a five months' gestation. In the case to be reported below, the uterus was no larger than a six weeks' pregnancy.

In considering the treatment of syncytial endometritis the significant point to remember is that we are dealing with a benign process. In the average case, uncomplicated by local or general infection, the treatment is curettage. A case, such as Cullen's with infiltration extending almost to the serosa would probably not respond to a curettage. Other conservative measures, however, which will be discussed

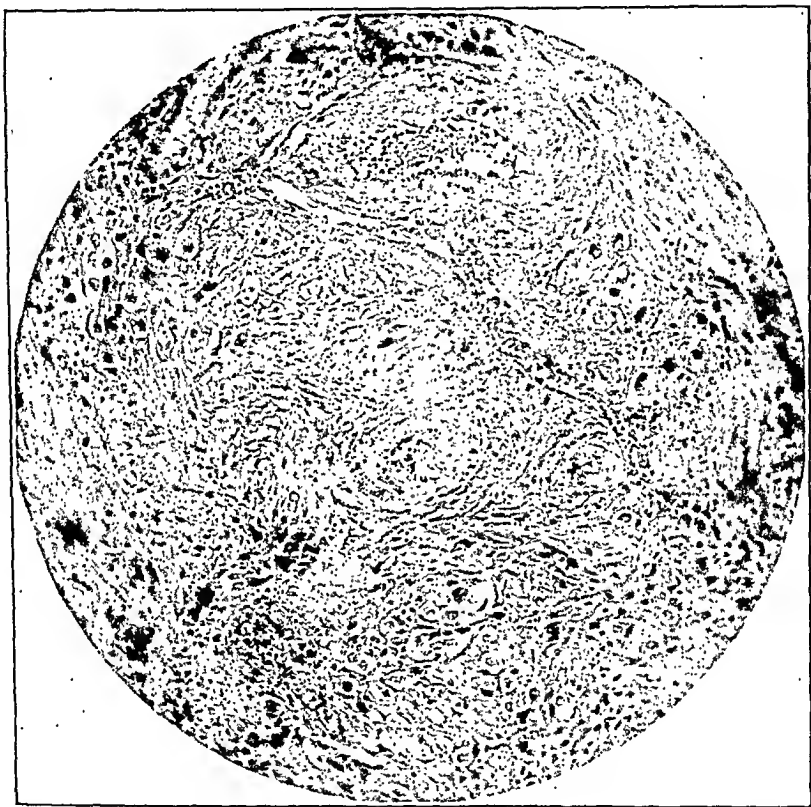


Fig. 1.—Syncytial endometritis. The deeply stained syncytial cells infiltrate the decidua and muscularis. The muscle cells show distinct hyaline changes.

with syncytioma, should be given a trial before resorting to hysterectomy. Menge<sup>18</sup> has declared it a crime to remove the uterus for this process. Fatalities, though they have occurred, have all been due to hemorrhages and infections and not to neoplastic manifestations.

#### REPORTS OF CASES

CASE 1. (*Syncytial Endometritis*).—B. L., aged twenty-seven, U. S., married (six months), housewife. Admitted to the Jewish Hospital of Brooklyn, December 28, 1925, service of Dr. M. Malament, to whom I am indebted for the privilege of reporting this case. Measles in childhood and subject to frequent colds and sore throats. Menses always regular. She had spotting for twenty-four hours with profuse vaginal bleeding for one hour prior to admission, associated with cramps and the passage of



clots. Her last menstrual period was eleven weeks previous to admission. She spotted on three different occasions since that time, at fifteen days, nine days, and three days before admission. The general examination was essentially negative. She showed profuse vaginal bleeding with clots, and she was curetted. The uterus was found to be the size of a six weeks' gestation, in third degree retroversion, and the external os was soft and patulous. During the curettage the operator noted that the posterior wall of the uterus was unusually friable and was mushy even considering that it was a uterus in a pregnant state. Urine examination was negative. Blood pressure 108/70; W. B. C., 7800 with 69 per cent polymorphonuclears; hemoglobin, 85 per cent; temperature ranged between 98.2° and 100.2°; pulse, 80-104; respirations, 20. There were no postoperative complications. Discharged six days after admission. She has been well since.

Microscopic examination of the curettings: Sections show uterine mucosa, decidual tissue, and musculature. No chorionic villi are present. The entire tissue is extensively infiltrated with large mono- and multinucleated syncytial cells which have hyperchromatic nuclei and the cytoplasm of which stains deeply with hematoxylin. The muscle tissue shows hyaline-like changes and the nuclei stain faintly. The acidophile syncytial cells are present within the lumina of a few of the blood sinuses. Some areas show considerable infiltration with polynuclear leucocytes and round cells. The few uterine glands which are seen are characteristic of pregnancy.

*Diagnosis: Syncytial Endometritis.*

This case is an example of what may be gained from routine examination of curettings. Ordinarily without a histologic examination the diagnosis of abortion would be made and accepted as such because of the immediate cure obtained by simple curettage. The extensive infiltration of the decidua and muscularis with the typical syncytial cells, the leucocytic exudate, and the hyaline and nuclear changes in the muscle cells, combine, however, to present a microscopic picture which is not seen in abortion. The discrepancy between the period of amenorrhea and the size of the uterus might be explained by an early fetal death. The idea has been advanced that excessive syncytial infiltration of the musculature leads to abnormal adherence of the placenta or to changes in the villi that result in fetal death. No villi were found in any of the sections studied. Apparently the process in this case was limited to the posterior uterine wall alone. In Ewing's case in which the entire uterus was studied the process was seen to involve the upper two-thirds of the posterior and the upper one-third of the anterior wall. Cullen's case involved the whole internal surface and v. Velit's<sup>26</sup> just a small area of the uterine mucosa.

#### SYNCYTIOMA

The term syncytioma has been adopted by Ewing to denote another type of transitional lesion in the chorioma group, this perhaps a more advanced condition. The chief feature of this process is the occurrence of the syncytial cells in sheets or masses, not as isolated cells as in syncytial endometritis. Further, the cells exhibit definite degenerative changes. Grossly the tumor is seen as a polypoid growth involving the greater portion of the uterine cavity. It is from one to

two centimeters in thickness, of a greyish pink color, and rather friable in consistency. The size of the uterus is here again dependent on the degree of its involution, also on the extent of the accompanying inflammatory reaction. Syncytioma like syncytial endometritis can occur only in connection with a phase of pregnancy. The disease, though obviously regressive in character, is by virtue of its cellular structure of a neoplastic order and appropriately named. Langhans cells, while they may be present at times, are an inconspicuous feature and do not show anaplasia or proliferative tendencies. This condition also is relatively benign in its clinical course. In the case cited below neither villi nor Langhans cells were found in any of the sections; thus the rôle of a relatively harmless invader is again played by the syncytial cells alone.

For the etiology of this condition nothing more can be said than what has been suggested for syncytial endometritis. The symptoms and clinical course are practically identical with what are seen in the previously described condition. It may be mentioned that with this process as well as with syncytial endometritis the onset of the disease may follow long after a pregnancy, abortion, or mole, since it has been seen that villous elements may remain viable in a uterus for months and even years.

#### TREATMENT

The management of this condition in most cases is conservative. As with syncytial endometritis, however, individual problems present themselves. So few cases of purely syncytial processes have been reported that it is difficult to formulate a definite plan of procedure. If the diagnosis be definitely established from curettings or discharged tissue, the treatment should certainly be expectant at the outset, provided the general condition of the patient is favorable. No doubt curettage alone has cured a considerable number of cases while others have gone on to spontaneous recovery through complete syncytial degeneration. If bleeding should persist or recur after thorough curettage, a case should be managed according to its clinical behavior, taking into consideration particularly the age of the patient, the degree of anemia, and the presence or absence of infection. Hysterectomy should not be resorted to at once in any case. For the bleeding and its resulting anemia, transfusion should be of great value. Perhaps, on theoretical grounds, the serum or whole blood of pregnant women might be of greater benefit, even in small quantities. The employment of transfusions is rarely mentioned as an adjunct in the treatment of chorionic lesions where bleeding is so often the main feature.

Filtered radiation therapy might well be advocated for the noninfected cases. A few reports of success with radiation in *malignant*

chorionic processes are available (Naujoks, Jung-St. Gallen, Sehauta, Hörmann, Adler, Payne, Clark). Because of the embryonic character of chorionic lesions, it would seem that radiation therapy should be applied more frequently. Naujoks<sup>20</sup> concluded that roentgen rays did at least what the curette or the exploring finger could accomplish.

In a woman past the childbearing period in whom conservative measures do not seem effectual, hysterectomy may be resorted to relatively early even if only to relieve anxiety or to accomplish an immediate result. In young patients, however, hysterectomy should rarely if ever be undertaken. Since there are no progressive metastases in purely syncytial lesions, if the histologic picture is definitely determined, there need be no apprehension about temporizing while closely observing the clinical course. When local or general infections complicate these conditions it would seem logical to treat the patient



Fig. 2.—Syncytioma. Gross specimen, uterus and adnexa, showing extent of involvement of the uterine cavity and cystic ovaries.

from the standpoint of the infection, disregarding the specific histopathology.

CASE 2. (*Syncytioma*).—W. L., aged thirty-five, U. S., married, housewife, admitted to the Rhode Island Hospital, Providence, May 14, 1924. I am indebted to Dr. C. Schradieck for permission to report this case. Patient had six children, oldest sixteen years old, youngest four months. Labors were normal. Miscarriage one year previous at four months. Menses began at age of thirteen, every twenty-one days, seven-day habit, profuse. Family history irrelevant. Measles in childhood. Chief complaint was "flowing." Patient was delivered of a full-term baby at home by a midwife four months before admission. She did well postpartum until she got out of bed on the ninth day, when she started to flow. Passed large clots every few days since then and bled profusely at times. Had bearing-down pains when the clots were expelled. Was confined to bed the last five weeks because of pain and weakness. Night sweats and chills about three times a week since the birth of the baby. Persistent vomiting also during the last five weeks.

General physical examination essentially negative. A mass was palpated in the abdomen the size of a large orange. Vaginal examination 5/16/24, mass size of

grapefruit to left of uterus intimately connected with the uterus and of fair mobility. Uterus normal in size (?). Appendages not felt. Fibroid uterus (?). Wassermann, 5/31/24, was four-plus. Operation 5/18/24. Dilatation and curettage, supravaginal hysterectomy, salpingo-oophorectomy (bilateral). Uterus was enlarged to size of two months' pregnancy, 3 irregular enlargements being in the right horn. Drain left in cervix.

As far as could be determined this patient is living and well.

Pathologic report by Dr. Schradieck: Specimen consists of an intracervically excised uterus obtained by wide hysterectomy. Specimen was received opened anteriorly. The uterus was somewhat enlarged, measuring 6.25 cm. in length, 9.5 cm. in width, and 4 cm. in thickness, and was filled with ragged masses of spongy tissue projecting from the posterior wall mainly in the form of a soft nodular spongy



Fig. 3.—Syncytioma. Shows sheet of syncytial cells with marked leucocytic infiltration.

growth, in parts showing indications of polypoid excrescences with signs of a very superficial necrosis. The growth involves the uterine myometrium quite extensively, more so towards the right side, the tissue showing for the most part a distinct hemorrhagic infiltration and at the same time even in the less hemorrhagic parts exhibiting a spongy structure. The tissue could be seen to spread about through the myometrium in the form of small islands as well as irregular progressing roots and strands and penetrating the whole of the myometrium well up towards its serosa covering.

*Microscopically:* Sections through the uterine wall showed the uterine muscle infiltrated with irregular branching masses of syncytial cells containing quite a number of multinuclear giant cells, the nuclei showing fragmentation and the cell bodies tending distinctly to regressive changes. In fact the latter changes are so pro-

nounced that the larger bulk of these cell masses appeared necrotic and showed loss of nuclear stain and only a faint outline of the cellular limits with the tendency of the same to fuse into irregular amorphous necrotic areas. Fibrinous exudation and hemorrhagic extravasation were interspersed between syncytial masses of this type. A distinct outline of chorionic structure was absent in the sections examined. There was considerable cellular infiltration with pus cells throughout the necrotic tissue and within the interstitial stroma of the myometrium.

*Diagnosis: Syncytioma (atypical chorioma).*

Most standard textbooks do not take up the purely syncytial lesions as a distinct entity. Hydatid mole and chorioepithelioma are usually discussed at length, but their clinical variations being dependent on specific histologic criteria are not adequately expounded. These and similar shortcomings in many special treatises may be held to blame for numerous cases erroneously reported as malignant chorioepithelioma. A few of these examples will be cited below, together with the few that have received proper recognition.

Marchand<sup>15</sup> designated as "atypical chorioepithelioma" (syncytial endometritis) those cases in which there was an extensive infiltration of the decidua and myometrium with isolated cells which from their histologic characteristics are identified as the syncytial wandering cells. Thus we have a rather distinct picture in which we note the absence of Langhans cells and villi. Frank<sup>10</sup> in discussing atypical chorioepithelioma states that in this form the Langhans cells are less numerous than in the typical form. He also illustrates with a photomicrograph a section of a lung metastasis of a case of atypical chorioepithelioma. Ewing doubts whether genuine progressive metastases have ever been observed in the atypical form. This case of Frank's no doubt belongs to the category of typical chorioepithelioma. Frank also makes the statement that histologic criteria are unreliable in judging this group of lesions. It must be admitted that cases occur which are difficult to classify absolutely from the histologic picture alone, but this is true in a measure of tumors in general, and it is felt that histologic criteria should not be slighted because of the exceptions.

V. Velits<sup>26</sup> collected eight cases of "chorioepithelioma" which recovered after curettage. Ewing found that five of the tumors were composed principally of wandering syncytial cells and belonged in the category of syncytioma and syncytial endometritis. Two of the cases were proliferating hydatid moles (Risel's and Blumreich's), and one (Graef's) was inadequately described. Ewing mentions other cases, those of Noble, Fleischmann, Cazin-Segond, Kolomenkin, and Horrmann in which the lesions were chiefly of syncytial nature, thus explaining the recoveries following partial removal of the tumor. The absence of proliferating Langhans cells in these cases would exclude them from the group of typical chorioepithelioma according to Ewing's and Marchand's classifications.

Proust and Bender<sup>23</sup> make mention of two cases considered to be chorioepithelioma and cured by curettage but which were really proliferating placental polyps.

Vinberg<sup>27</sup> reported nine cases of chorioepithelioma with eight cures following hysterectomy. He attributed these excellent results to early diagnosis rather than to the possibility of their being transitional lesions. No photomicrographs are submitted and a histologic description is given in only two of the series,—Case 1, and Case 7, the fatal one of the group. In Case 1 the greater part of the tumor is composed chiefly of syncytial masses. In Case 7, the fatal one, the pathologic de-

scription states that the histologic study showed an atypical variety of chorioepithelioma (Marchand) with syncytial cells and Langhans cells being present.

Novak<sup>21</sup> knows of five cases in which the uterus was removed because of a diagnosis of chorioepithelioma and only one of these was found to be the seat of the disease by Cullen. It is felt that the fully malignant chorioepithelioma or carcinoma is a distinctly rare condition and the transitional lesions far commoner than is generally conceded. In eleven years at Bellevue Hospital, out of 8,000 autopsies and more than 3,500 surgical specimens examined, Gordon<sup>13</sup> states only one chorioepithelioma was found, and this, a metastatic growth of the vulva, was doubtful. Cases of Hitschmann and Cristofolletti are not accepted by Teacher.<sup>25</sup> In a series of 200 hydatid moles these authors found fifteen that resulted in chorioepithelioma, a percentage of 7.5. Teacher regards this as a high percentage, especially since all recovered after operation, and he questions the validity of the diagnosis of malignancy.

Ferguson<sup>8</sup> recently reported a case as early chorioepithelioma in which a panhysterectomy was done with a bilateral salpingo-oophorectomy. The microscopic description by the pathologist as well as the photomicrograph submitted showed a typical picture of syncytial endometritis.

McClellan<sup>16</sup> reported a case of atypical chorioepithelioma, a true example of syncytial endometritis. The patient, four months after a three months' miscarriage developed chills, fever, and hemorrhage. The tissue discharged by the vagina showed typical syncytial cells. This patient during the course of her illness was seized with sharp pain in the left thorax and began to cough with a bloody expectoration. Examination of the sputum showed the same syncytial cells as were seen in the tissue from the uterus. The patient recovered. McClellan recalled two similar cases which were reported chorioepithelioma by the pathologist.

Meleney<sup>17</sup> reported a case of syncytioma which terminated with acute peritonitis. This is one of a small number of fatalities occurring with syncytial lesions. Fatalities, however, are never due to progressive metastases, but to hemorrhage and local and general infections.

Geist<sup>12</sup> reported two cases of syncytial endometritis (syncytial hyperplasia) and two cases of syncytioma. The cases of syncytioma had hysterectomies performed because the picture suggested chorioepithelioma.

Findley<sup>9</sup> reported a case in a primipara of twenty-four who passed a hydatid mole and three months later had slight bleeding. A nodule was removed from the vaginal wall and was found to contain syncytial cells. A hysterectomy was performed with removal of both tubes and ovaries. No chorionic tissue was found in the uterus. It is reasonably believed that the finding of a syncytial nodule in the vaginal wall with slight bleeding is not an indication for radical surgery, even though following a hydatid mole. Findley further states that if bleeding follows the delivery of a mole (weeks, months, or years later) and curettings show proliferating syncytial tissue a hysterectomy must be performed. He evidently reaches this conclusion from his statistical study of 500 cases of mole formation, in which he claims that chorioepithelioma malignum developed in 157 cases or 31.4 per cent. This percentage is extremely high and at wide variance with most authors. Teacher, as has been stated above, believes that 7.5 per cent is too high. Novak states that if the great frequency of hydatid mole is established, as put forth by Meyer<sup>19</sup> and others, the percentage of malignancies would probably be a small fraction of 1 per cent. In view of the statistics of others therefore, Findley's 157 cases of malignant chorioepithelioma must be questioned as to validity of diagnosis, just as those of Hitschmann and Cristofolletti's are doubted by Teacher.

Deaver,<sup>6</sup> in 1914, reported a case in which he did a supravaginal hysterectomy for the reason that on hysterotomy the placenta was found friable. The patient had urinary symptoms, left iliac pain, and leucorrhea frequently blood-tinged. The

microscopic diagnosis, without description, was given as "deciduoma malignum," and the statement was made that this lesion originated from the syncytial cells of the chorionic villi. It may be mentioned incidentally that this term was applied to chorioepithelioma by Sänger, in 1889, at a time when its histogenesis was not understood. It has become obsolete since the appearance of Marchand's work.

Numerous other examples may be gleaned from the literature of diagnoses based on inadequate knowledge of the life history of the histologic elements in chorionic growths, particularly the syncytial forms. In my opinion statements which tend to minimize the importance of histologic detail are ill-advised and misleading, for it is seen, the histologic findings best explain the outcome of the majority of cases. The clinical course, however, is of no small significance in the chorioma group, but we feel it is of no greater moment here than in any other pathologic process.

I have purposely not dwelt on the subject of the typical malignant chorioepithelioma or chorioepithelioma. Little new can be added to what has been so frequently discussed. It is the atypical, the transitional lesions which have not received sufficient space and appreciation. With few exceptions writers have not adequately stressed the latter group of conditions. It is obvious that malignant chorioepithelioma cannot in all cases be interpreted properly without a concept of the syncytial processes.

#### CONCLUSIONS

1. Two cases are presented of transitional lesions in the chorioma group: (a) Syncytial endometritis; (b) Syncytioma.

2. The lesions are essentially benign.

3. The treatment of syncytial endometritis is conservative, curettage being the method of choice in the majority of cases.

4. A review of the literature shows that there is not a general cognizance of these lesions and further that many cases reported as typical malignant chorioepithelioma are really of these transitional types.

5. Without the recognition of the syncytial or transitional group the malignant tumors cannot be interpreted properly.

6. It is felt that the incidence of typical malignant chorioepithelioma or chorioepithelioma is much less frequent than has been supposed.

I wish to express my sincere thanks to Doctors Ewing and L'Esperance for their helpful suggestions and to Mr. J. Dunn for the photomicrographs.

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435 GRAND AVENUE.

## OVARIAN LUTEOMA, WITH CASE REPORT

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**L**UTEOMA pathologically designates a malignant ovarian tumor derived from lutein cells. It is of extremely rare occurrence, and a review of the literature by Glynn<sup>1</sup> has shown only fourteen reported cases until the year 1921. Nine of these are quite authentic, five are open to question. Ten other tumors of similar structure are reported as "ovarian hypernephroma." The justification of this last designation has been based upon ill-defined and uncertain criteria as follows:

1. *Presence of Accessory Suprarenal Glands or Cortical Rests in the Pelvis.*—In the female, aberrant suprarenal tissue has been encountered in the hilum of the ovary, tube, and broad ligament; in the male, along the spermatic vessels and the epididymis. Since the suprarenal cortex arises from the mesothelium in the zone of the wolffian gland, it is in close proximity to the genital ridge where ovary and testicle are formed. Misplaced suprarenal segments can thus be readily carried into the pelvis with the sex organs, in the migration of the latter from the abdominal to the pelvic cavity. Possible local formation directly from the peritoneum is entertained by Robert Meyer. There are, however, no reported cases of suprarenal cortex in the body of ovary or testicle. Ovarian tumors of this nature, if they occur at all, therefore are actually secondary, arising in the broad ligament and extending later into the ovarian stroma. Pick reports such a case.<sup>2</sup> In the strictest sense, therefore, the ovary cannot be the primary seat of a "hypernephroma."

2. *The Gross Appearance of the Tumor.*—The larger tumors reported as "ovarian hypernephroma" are solid, yellow in color, with areas of necrosis and zones of interstitial hemorrhage, thus grossly



simulating the more common renal hypernephromas. In recent years, even this Grawitzian group has been sharply curtailed and as first demonstrated by Sudek, many of these tumors are actually adenomas and adenocarcinomas of the kidney parenchyma itself. The gross appearance, therefore, cannot be safely used to serve for the basis of histogenetic origin of tumors. This is especially true in the ovary where other lipoid-holding cells, i.e., lutein, give the same yellow color, and hold the possibility of originating these tumors.

3. *The Histologic Appearance of the Tumor.*—The component cells of these “ovarian hypernephromas” are clear and glassy, and frequently rows of cells rest directly upon the capillaries. The picture reproduces the zona fasciculata of the suprarenal cortex when the cells are fat-laden. Yet, as demonstrated by Glynn, the same picture



Fig. 1.—Cross section through the tumor of the right ovary. Bands of connective tissue divide the tumor into irregular opaque lobules. Where degeneration has occurred cystic cavities are present. Several of them, however, are follicular in origin.

is reproduced in the reported cases of luteoma. Contrasting the orderly arrangement of cells in both groups with the marked cell anaplasia of true suprarenal cortex tumors, Glynn concludes that luteoma and “ovarian hypernephroma” are the same; reported “ovarian hypernephromas” belong actually to the lutein group. This deduction is further strengthened by absence of secondary sex changes (hirsutes, change of voice, atrophy of breasts, uterus, etc.) in the ovarian tumor groups, though these changes are constantly found in true cortical tumors of the adrenal gland.

At best, therefore, “ovarian hypernephroma” rests upon a most weak foundation, and even if truly encountered, presents a tumor secondarily invading the ovary, and not actually a tumor of the ovary per se.

The accompanying case report presents a bilateral yellow grey tumor of the ovaries. The left ovary, though relatively normal in size, has been almost completely replaced by tumor. Entrance from the broad ligament or hilum is definitely excluded, for a shell of ovarian tissue completely encircles the organ. Histologically, the cells are pale staining, even though the cytoplasm is coarsely granular. A perivascular arrangement is lacking, and the cells are not in contact with the capillaries, excluding a formation that mimics in the least the zona fasciculata of normal suprarenal glands. In brief, the tumors are of the "clear cell type"; they arise in the ovary, and do not resemble hypernephroma in morphology or arrangement. Luteoma is therefore very properly diagnosed as will be more fully shown later.

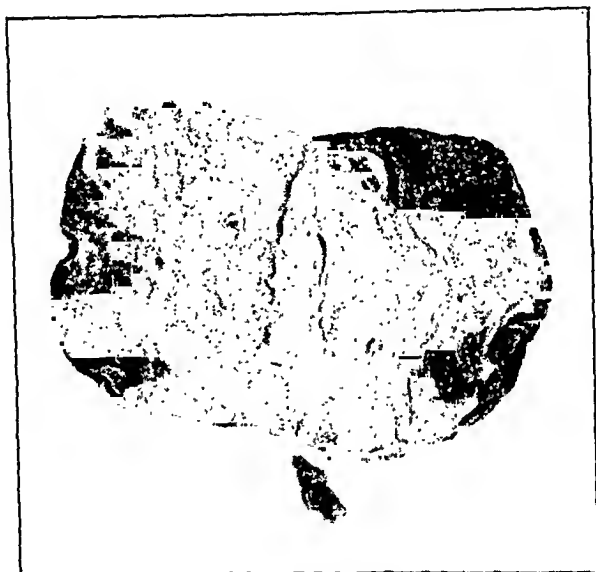


Fig. 2.—Section through the left ovary. The organ is only slightly enlarged. A few follicular cysts are present in the cortex. Stroma is largely replaced by opaque tumor tissue.

The clinical features of the case are briefly summarized as follows:

Miss G. S., aged twenty-one, was admitted to Dr. Polak's service of the Long Island College Hospital, on Dec. 29, 1924, complaining of irregular menstruation and pain in the right lower abdomen. The family history was essentially negative and irrelevant to the present illness. Except for typhoid six years before, she had been always well. Menses began at the age of fourteen, recurred every 28 to 34 days for 6 days, and were generally associated with moderate comenstrual pains. These had become more intense with the present illness. Last menses occurred Dec. 28, 1924; the prior period Dec. 13, 1924. Patient was unmarried.

For the previous two months, the patient had menstruated every two weeks for 5 to 6 days. Bleeding was associated with a dull pain in the right lower abdomen but it was markedly aggravated with the onset of bleeding. Pain, however, had not been sufficient to incapacitate the patient.

*Laboratory Data.*—Urine: normal; B. P. 118/80; Blood: Hb. 80 per cent; W. B. C. 10,400, Neutrophiles 79 per cent, Lymphocytes 21 per cent.

*Physical Examination.*—Patient, a white female, weight 150 pounds, height five feet five inches, able to walk about, was not acutely ill. She was mildly obese and appeared older than stated age. Complexion was fair. Head—negative; eyes protruded slightly; slight obstruction to nasal breathing. Mouth showed a great deal of bridge-work and gold. Pharynx: tonsils enlarged, pale color. Neck—negative; thyroid was slightly enlarged and palpable. Thorax—emphysematous type, breasts well developed. Bilateral equal expansion, tactile fremitus normal. Percussion revealed good resonant note anteriorly and posteriorly. Auscultation showed normal vesicular breathing anteriorly, no rûbs, no râles. In lower posterior back breathing was distant, no rûbs, no râles. Heart—negative. Pulse of good quality, 112 per minute (excitation).

Abdomen was distended. No rigidity was present, but tenderness was elicited in right lower quadrant near the midline. A mass about the size of a large orange was palpable in the right lower quadrant. Marked tenderness was found on deep pres-

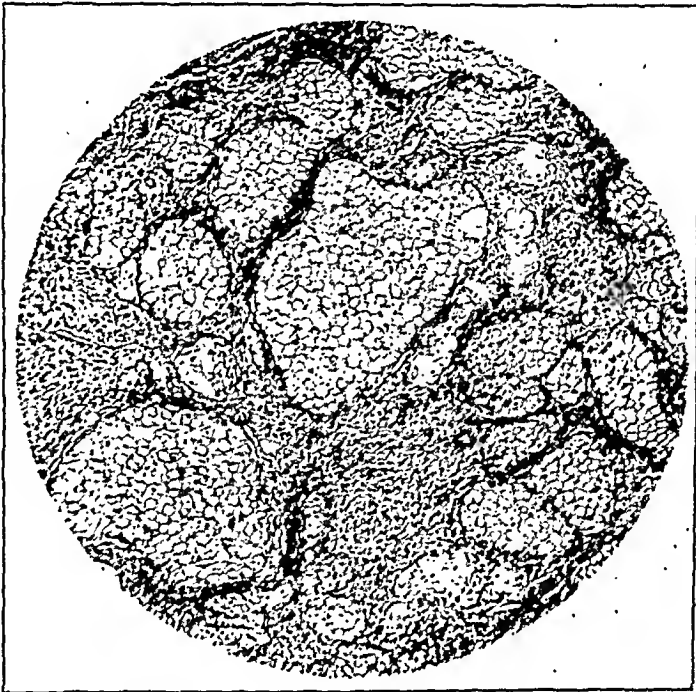


Fig. 3.—Microscopic section from the left ovary (x100). Note the irregular alveoli of compact cells. The latter are granular, and pale with sharply defined borders. The nucleus is eccentrically placed. The stroma is of the spindle-celled type.

sure over this area. Flatness was present in both flanks and over the palpable mass. Percussion was tympanitic over the rest of the abdomen.

Extremities—negative. Pelvic examination revealed a normal vaginal introitus with crescentic hymen, anteverted cervix, and anteverted uterus. A mass was present in the right abdomen, movement of which did not transmit an impulse to the cervix.

Stereoscopic roentgen examination showed no rib, diaphragmatic, or cardiac pathology. Bronchi and pulmonary parenchyma were free from changes. There was no evidence of tumor metastasis.

Operation was performed by Dr. Polak, on Jan. 10, 1925. "Median abdominal incision; small amount of free fluid was present in the peritoneal cavity. The uterus was displaced posteriorly and to the left by a large solid tumor of the right ovary. It was slightly twisted on a short broad pedicle. The left ovary was also replaced by a tumor mass and measured 3 cm. in diameter. Double salpingo-oophorectomy

was performed; the uterus suspended, and the wound closed after a cigarette drain was left in culdesac."

Postoperative course was uneventful. No morbidity; highest temperature 101° on second day. Patient was discharged February 20, 1925; wound healed by primary union except for a small granulation at the lower angle. Uterus was in normal position; broad ligaments were free from exudate. No free fluid was present; flanks were tympanitic.

Follow up: The patient has not been seen since discharge from the hospital and efforts to locate her have been futile so that the ultimate clinical result is unknown.

#### PATHOLOGIC REPORT

*Tubes and Ovaries.*—The right adnexa presented changes as follows: The tube measured 75 by 6 mm. and was of normal form and contour; abdominal ostium was patent and the fimbriae were normal. Close gross inspection of the broad ligament

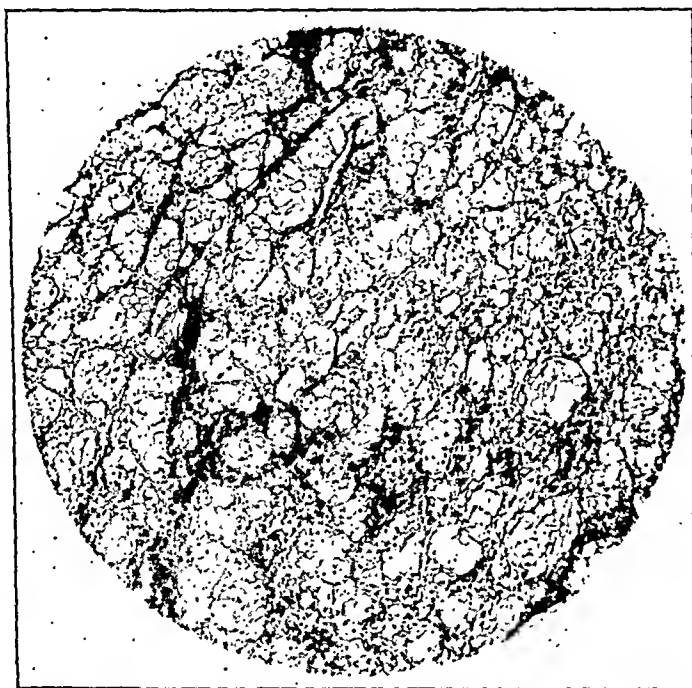


Fig. 4.—Another view of the tumor (x100). Growth is more diffuse but definition by fibrous septa, persists. The cells are clear but of granular texture. Many nuclei are lacking; others are displaced towards the cell membrane.

showed no changes. The ovary was enlarged to an ovoid mass the size of a cantaloupe, measuring 15 by 10 by 5 cm. It was solid in structure and firm to the touch. The surface was smooth and shiny and the vessels were prominent. The color was largely yellow-gray. On section the tumor dripped fluid from opened cysts scattered through the interior. The tunica served as a capsule for a tumor which filled the entire organ and presented dense, opaque, compact, yellow-gray masses. In foci, strands of connective tissue subdivided the tumor into large alveoli. Several irregular cystic cavities varying from 1 to 2 cm. in size were irregularly distributed but were more numerous centrally. Stroma was relatively scant.

The left tube, like its fellow, was normal and measured 70 mm. The broad ligament was normal. The ovary was of normal size and measured 3 by 2 by 2 cm. It was ovoid in shape. Surface was smooth, gray-yellow in color. Consistency was normal. On gross section the tunica was normal. Through the cortex were scattered several follicular cysts. The bulk of the cortex and medulla was filled with tumor

tissue as essentially noted in the other ovary. Several regressing corpora lutea were strewn through the medulla between the tumor elements. Cysts were lacking in this ovary.

Histologically, the structure was similar in each ovary, and the following description, therefore, serves for both organs. The germinal layer was poorly preserved and only few of its cells were seen. Subjacent the tunica was narrow, sharply defined, and free from tumor cells. The bulk of the organ was replaced by epithelial alveoli supported by a cellular fibrous stroma. The alveoli varied in size. In shape, they were round, oval, or irregular. In areas, the growth was more diffuse, and small, closely set cell clusters were separated by fine narrow fibrous septa.

The component epithelial cell showed a slightly varying structure. Least frequently and generally in the basal layers of the larger alveoli it was small, round or oval in shape with a fairly deep staining granular cytoplasm. The cell outline was defined, and the round vesicular nucleus lay centrally. As a rule, however, the

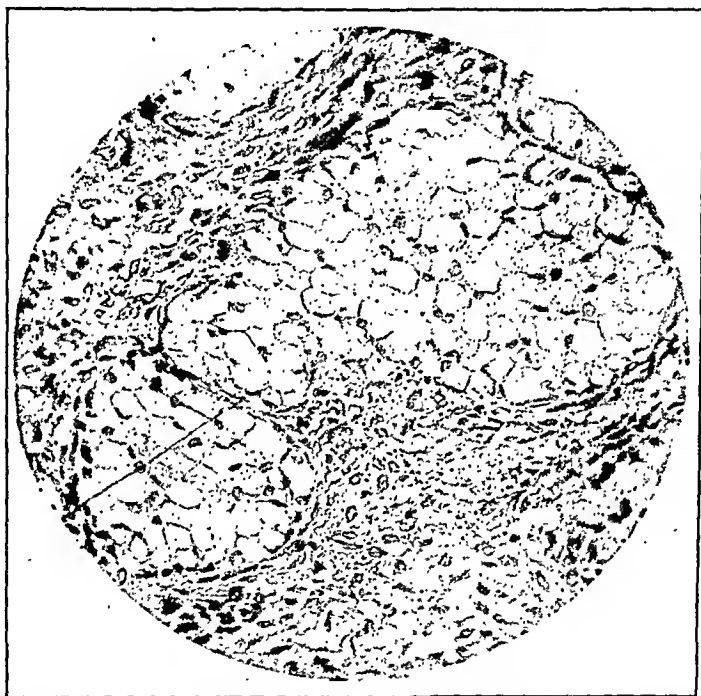


Fig. 5.—Showing irregular alveoli of compact cells in mosaic arrangement (x350). Cytoplasm is granular, cells are pale, and nuclei flattened against the cell membrane. An occasional one persists centrally in the cell.

cells were larger, and were round, polygonal, or ovoid in form with most distinct cell outlines, so that the appearance was actually mosaic. The cell cytoplasm was abundant, stained faintly with cosin, and though granular, the cell generally was pale. The nucleus stained more deeply, was solid or vesicular, and was eccentrically placed. Generally, the central areas of the alveoli presented these cells. As the latter enlarged, their clarity was increased, their staining capacity diminished, and the nucleus which was flattened and elongated was compressed against the cell membrane. Some were crescentic and reminiscent of nuclei of heavily laden fat cells. Degeneration was not infrequent and many cells were devoid of nuclei. Where necrosis was of longer duration the cells had fused into a ragged irregular debris filling the center of the alveoli and forming some of the cystic spaces grossly noted. In the zones of diffuse growth, the large pale cell, with its compressed, eccentrically placed nucleus, was very prominent. Intermingled with the tumor elements, were moderate numbers of recent and old follicular cysts. In the left ovary remnants of

regressing corpora lutea were also encountered. Nests of tumor cells encroached upon all these structures. The stroma was of the spindle-celled, fibroblastic type and was fully matured. Its quantitative distribution was varied, presenting in fine septa where the growth was diffuse, or in broad compact zones about the larger alveoli. Everywhere the epithelial cells were defined by fibrous tissue and were not in contact with capillaries. Generally the latter were free, narrow, and did not form a prominent feature. Several small venules were encountered.

### Differential Diagnosis:

Pale cell tumors in the ovary may result from:

1. Edema or hydropic degeneration of an originally opaque cell tumor.
2. Accumulated mucus in the cell cytoplasm of the tumor.
3. Abundance of fat or lipoids in the cell cytoplasm of the tumor cell.

In the tumor under discussion, edema and hydropic degeneration can be readily dismissed. Though the right ovary showed slight torsion at operation yet the small left ovary, free from mechanical displacement, presented epithelial alveoli in every way similar to those of the right. No edematous changes were found in the stroma; capillaries were free from congestion. Edema or hydropic degeneration, therefore, cannot explain the pallor of the tumor cells in this case.

Mucin-holding cells in the ovary are restricted to two tumor groups, i.e., pseudomucinous cyst adenomata and the metastatic carcinomata. In the pseudomucinous group, the large cystic locules filled with mucin, form the predominant picture on gross appearance. Some cysts are retained even in those of malignant stamp. In the benign (parvilocular) pseudomucinous adenoma, the element causing solidarity is the accumulated mucus. Microscopically miniature but definite gland spaces are always retained and are of benign character. In the tumors here presented primary cystic changes are lacking; grossly mucin is absent. The size is due to growth of solid epithelial nests. The focal cysts are the result of central necrosis of tumor alveoli or cystic atresia of the primordial follicles. Bilateral occurrence of the tumor also argues against pseudomucinous cystadenoma. Histologically, the goblet cell of the columnar type with its clear translucent mucus in the proximal cell zones (so typical of the pseudomucinous cystadenoma) is lacking. For the case in point presents large round or polygonal cells, and though the cell is pale and stains faintly, the groundwork of the cytoplasm is granular. Pallor of the cell is the result of condensation of cytoplasm into granules, leaving intervening zones clear of cell substance. These changes were so decided that carmine stains were not believed necessary for the exclusion of pseudomucinous tumors.

The metastatic mucin-containing tumors of the ovary generally originate in the stomach or gall bladder and comprise adenocarcinomata and the Krukenberg tumor group. Only the latter type needs

discussion for our purposes. The Krukenberg tumors are bilateral, usually large, and frequently give no symptoms indicative of their primary seat. Grossly on section they are characterized by their transparent or wax-like appearance. In four cases studied in the past two years this tumor group presents several distinctive features: (1) The epithelial cells are diffusely scattered as solitary structures in a hyperplastic stroma. (2) The cell outline is distinct; cytoplasm pale, clear, and homogeneous with a flattened nucleus in contact with the cell membrane producing the "signet ring" form. (3) The stroma shows marked hyperplasia, and as a result the tumor was originally considered as a sarcoma. Free masses of mucus irregularly infiltrate the component stroma cells. The tumor structure of the specimen here reported showed a distinct alveolar growth, the cells though granular were pale; the nuclei though markedly eccentric could be found in the central zones of the cell body as a vesicular structure. The supporting stroma was always definable from the cell of the tumor and presented no undue hyperplasia or infiltration with mucus. The morphology, therefore, was decidedly different from metastatic ovarian tumors of the Krukenberg group.

Lipoid-containing cell tumors include hypernephroma and luteoma. Hypernephromata of the ovary, if they occur at all, are not primary ovarian tumors. They originate in the broad ligament with secondary extension into the ovary. This etiology is definitely excluded in this case, for both at the time of operation and in the specimen removed the broad ligaments were free. Microscopically, the tumor cells lack the clear glassy appearance of the Grawitzian group; they are not in relation to the capillaries, there is no simulation of suprarenal cortex. At best, cell pallor and clarity, and sharply-defined cell outlines are the only features suggestive of suprarenal origin.

In the ovary where the lutein cell is found these characters are entirely insufficient, for it also possesses gross and histologic features quite similar to that of the suprarenal cell. Normally except in the stage of hyperemia, the corpus luteum with its chrome or canary-yellow color, reproduces the tint of renal and other hypernephromata. Histologically there are several most important characters of the lutein cells to be emphasized. Though small and spindle-shaped with little cytoplasm in the stage of hyperemia, the lutein cell rapidly changes during vascularization. It is now large, round, or fusiform with sharp borders. The granular cytoplasm is pale, especially as the efflorescent stage is reached. Contact with capillaries is established after the latter invade the lutein column. In the Blüthstadium, lipoids rapidly infiltrate the cell; the cytoplasm is paler, though granular. During involution of the corpus, the cytoplasm becomes completely clear or homogeneous; the nuclei are karyolytic in type or pyknotic. The lutein cell, therefore, in its normal cycle of development and regression passes from a pale granular to a clear cell. It

remains closely in contact with the capillaries during its later stages. This anatomic picture can, therefore, readily furnish the pattern for all unusual forms of pale cell carcinomas of the ovary without incriminating suprarenal rests, which have never been anatomically recorded in either ovary or testicle. The finding of these tumors only in the ovary lends further weight to the lutein origin of the tumors here recorded.

The constituent cells of the tumors here reported morphologically resemble lutein cells in the following ways: (1) They are round, oval or polydehral in shape, and mosaically arranged. (2) They possess abundant cytoplasm, granular in type with poor staining capacity. (3) Round or oval vesicular nuclei centrally placed are found in the deeper layers of the larger alveoli. Eccentric nuclei are found in the largest cells where advanced cytoplasm changes have occurred. Whether cell pallor is due to accumulated fat is unfortunately undeterminable from this study. The gross tissues had been passed through alcohol (after Kaiserling) before this fact was fully appreciated. Those sections stained with Sudan III would, of course, fail to stain, even if lipid were originally present. Yet, from the similarity of the cells with those of lutein origin and the exclusion of other tumors of pale staining cells, the diagnosis of luteoma seems justified and well supported.

#### CONCLUSIONS

1. Lutein tumors of the ovary have been erroneously interpreted as "ovarian hypernephromata."

2. The yellow color of these tumors, the clear cells, and the intimate relation to capillary walls are insufficient criteria to show suprarenal cortex histogenesis.

3. The normal corpus luteum in several of its developmental and regressive phases possesses gross and histologic features which mimic suprarenal cortex structures. Tumors of lutein origin retain some or all of these characters.

4. The enclosed report describes in detail the clinical history and the gross and microscopic findings of a true ovarian luteoma. The cells are of the pale type but granular, grow diffusely or in alveoli, and have no contact with capillaries. The tumors are gray-yellow on gross appearance.

My thanks are herewith extended to Dr. John O. Polak, and Dr. Archibald Murray for their suggestions; and to Mr. James V. Dunn, for his excellent photographs.

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# PULMONARY EMBOLISM COMPLICATING PREGNANCY, LABOR, AND THE PUERPERIUM\*

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**A**MONG the less frequent complications of pregnancy and sequelae of parturition, pulmonary embolism, though uncommon, must be considered one of the most serious, for it carries with it a very high mortality. Because of its rarity, it seemed unwise to be content with a small series of cases in any one institution and, therefore, to the cases which occurred at the Sloane Hospital for Women during the last five years, have been added those cases which occurred at the Woman's Hospital of New York, and the New York Lying-in Hospital for the same period. In seeking the information desired for this study, complete cooperation was received from those in charge of these hospitals and the courtesy of their record rooms was cheerfully granted. During this five-year period, 31,716 pregnant patients were cared for in the three hospitals, and there were thirty-two cases in which a diagnosis of pulmonary embolism was made, giving an incidence of approximately 0.1 per cent. Of the thirty-two cases so diagnosed, twenty-one died, or more than 65 per cent.

Before proceeding with a detailed study of these cases, we may consider briefly the origin of the embolus, for there are several opinions worthy of consideration. It is generally agreed that the embolus may be the whole or a part of a thrombus in the venous circulation which is carried up the inferior vena cava into the right auricle of the heart, and then into the right ventricle from which it is forced into the pulmonary artery itself or into one or more of its main branches, completely occluding the vessel where it becomes lodged. In considering pulmonary embolism complicating pregnancy, labor, and the puerperium, there are some who believe that the embolus is derived directly from a thrombosis of the uterine sinuses, while others are firm in their conviction that there is a preexisting thrombosis of the femoral, iliac, or saphenous veins. It seems doubtful that an embolus large enough to occlude the pulmonary artery could arise from the uterine sinuses because the return circulation from these sinuses must be by the way of smaller veins emptying into larger tributaries even before the uterine plexuses of veins are encountered. These plexuses are most tortuous and in them would probably be caught any fair-sized embolus before being carried into the uterine or

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ovarian veins. It might be conceded that a very small plug could be carried along this tortuous route and gain access to a small ramification of the pulmonary artery and give rise to the formation of a pulmonary infarct.

Another view, namely, that the embolus arises from a thrombosis in the femoral, iliac, or saphenous veins, is supported by Ludwig Aschoff, professor of pathologic anatomy in the University of Freiburg. In his "Lectures on Pathology," delivered in the United States in 1924, he very clearly and conclusively points out why he believes this opinion is correct. The factors involved in the formation of the primary thrombus may be found in changes in the blood plasma and blood elements, and in changes in the rate of blood flow and in the vessel walls. The first step in thrombus formation is a local accumulation of blood platelets in the circulatory blood along the vessel wall, due to valves, widening of the vessel, or other mechanical factors which cause a slowing of the blood stream. As more platelets are deposited in this framework, the vessel becomes occluded and the blood ceases to flow and the blood directly beyond becomes stationary. At the site of occlusion of the vein is the so-called "white thrombus," while the coagulated blood beyond becomes the "red thrombus" which gives rise to the embolus. In discussing thrombus formation von Recklinghausen states that the production of eddies in the blood is a more important factor than the mere slowing of the stream. Backward pressure exerted by the column of blood beyond may cause widening of the vein, which widening may be increased by the venous pulse, and the thrombus may occur at this site.

Another factor to be considered in the localization of a thrombus is that of pressure on the vein by some overlying structure, as the femoral vein passing under Poupart's ligament, or the left iliac vein being pressed upon by the large arterial trunks. In addition, changes in cardiac force and loss of blood, as from hemorrhage in labor, are other factors involved. Granting, therefore, that changes occur both in the rate of blood flow and in the blood platelets, still another factor in thrombus formation must be ascribed to changes in the vessel wall itself, usually in the form of endothelial damage. At such a site along the vessel wall we may expect to find an accumulation and adhesion of blood platelets and the formation of a thrombus.

If, as in puerperal sepsis, the thrombi at the placental site becomes infected a condition of thrombophlebitis results and this in turn may progress and give rise to pyemia. On the other hand, in the absence of infection, by a careful study of the thrombi removed from the pulmonary artery in cases of sudden death, Aschoff has shown that these plugs are made up of thrombi corresponding in thickness and size to that of the femoral vein, and from this he concludes that, in all probability, the embolus arises from the femoral vein due to a static throm-

bosis. If this be true, our attention in caring for the parturient patient, if we would decrease this complication following labor, must be directed to overcoming stasis in the circulation of the lower extremities, as well as to asepsis and antisepsis.

Thrombosis is, of course, possible without embolism ensuing, in which case secondary changes occur in the thrombus. These changes are processes of organization and degeneration so that eventually the entire thrombus may disappear. Or, more frequently, vascularization may occur and new vessels may then be formed in the clot and the circulation may be reestablished. It is during the process of organization and degeneration of the thrombus that secondary embolism occurs. Osler tells us that as organization of the thrombus increases, the danger of secondary embolism decreases, but that degenerative changes in a thrombus in the form of liquefaction and softening increases the danger of secondary embolism. Furthermore, secondary embolism occurs most commonly after thrombosis of the iliac veins, next in frequency after saphenous thrombosis and then after that of the femoral veins.

A discussion of embolism at the time of labor would be incomplete if something were not said concerning air emboli. That this condition occasionally exists no one will doubt if he will turn to the literature, for many apparently authentic cases are recorded. James A. Gough of Chicago draws attention to this condition, arising especially in cases of placenta previa, also in cases in which an intrauterine douche is used to free an adherent placenta, in cases of version and breech delivery, and in cesarean cases. The remarkable case of Cordwent is worthy of note in this connection; the patient delivered in the standing position and as the child fell, the placenta was dragged out immediately after. The patient cried out aloud, gasped and died suddenly. The diagnosis of the cause of death was made at autopsy when a large quantity of air was found in the heart. Direct entrance of air into the uterine cavity may, therefore, be the cause of sudden death. Williams admits the possibility of the occurrence of air emboli, but correctly implies that bacteriologic study in most of these cases would show the *Bacillus aerogenes capsulatus*. It is unnecessary to discuss the exogenous emboli as we are not concerned with them in pregnancy and the puerperium.

Having briefly discussed the formation, localization, and character of thrombosis, which gives rise to pulmonary embolism, as met with in the practice of obstetrics, we may now direct our attention to a survey of this complication. The symptomatology is clear cut and almost pathognomonic in the majority of cases. The most constant symptoms and signs are sudden pain in the precordial region or posterior aspect of the chest, marked cyanosis and dyspnea with air hunger, rapid increase in the pulse rate, cough, and occasionally blood-

streaked, frothy sputum. Of course, all these symptoms and signs are not present in each case, but usually there is a combination of two or three. In some instances, however, death occurs so rapidly that there is not time for the symptoms to be produced, as in the typical case of a patient who sits up in bed, gasps a few times and falls over dead. In the cases in which death does occur suddenly, very definite physical signs in the chest may be found. These signs may be dulness on percussion, diminished or bronchial breath sounds, and the presence of râles most commonly occurring at the base of either lung, but more often on the right side. These signs may be readily confused with those of pneumonia, but with the sudden onset, and in combination with the history and symptoms, differential diagnosis is not difficult. In the cases which develop pulmonary signs and symptoms, there is sometimes a chill, followed by a temperature which may reach  $102^{\circ}$  to  $103^{\circ}$ .

In this series of thirty-two cases in 31,716 patients, pulmonary embolism occurred six times in the early months of pregnancy. All of these cases, however, were associated with some condition complicating the pregnancy. There was one unruptured ectopic in the second month on which a right salpingectomy was done; there were two cardiac patients on whom abdominal hysterotomy and sterilization by resection of the tubes was performed during the third and fourth months of pregnancy. It occurred in a woman at two months who had five children and a very marked ventral hernia. In this case, hysterotomy with sterilization and repair of the hernia was done. In two cases in the fifth month, pulmonary embolism occurred after laparotomy, once for a large dermoid cyst of the right ovary with removal of the right ovary, and once in a case who had a marked toxemia. This case, when abdominal hysterotomy was done, was found to be an hydatidiform mole, and as the ovaries were cystic the left tube and ovary were removed and a plastic was done on the right ovary. In this series of six cases, all of whom were abdominally operated, there were four deaths or 66.6 per cent.

The remaining twenty-six cases who had pulmonary embolism were delivered in the eighth or ninth months of pregnancy, the signs and symptoms arising postpartum in twenty-four, for one had a decompensated cardiac condition and died before the onset of labor, and another cardiac had a pulmonary embolism in the fourth month of pregnancy, recovered and went safely through labor and the puerperium. It cannot be argued from this, however, that pulmonary embolism does not occur in uncomplicated cases antepartum, but we cannot expect to find such cases in hospitals, because if the case so diagnosed does not die suddenly, the physician in charge certainly would not assume the additional risk of transporting his patient to a hospital. It is doubtful if the age of a patient has any bearing on the

incidence of pulmonary embolism, as in the series of twenty-four cases occurring at or near term, the patients ranged in age from eighteen to forty-six years; it happened in five patients between the ages of eighteen and twenty-five, in fifteen cases between twenty-six and thirty-five, and in four women between thirty-six and forty-six. In this group of twenty-four cases, there were nine multiparous and fifteen primiparous patients.

Turning now to a consideration of the type of labor and delivery in this series of twenty-four postpartum cases, we find that only two had a first stage of more than twenty hours, and in only one was the second stage more than two hours. In no instance was the third stage more than twenty minutes. That very rapid labor plays no part may be seen by the fact that there was not a single instance in which the labor was less than six hours. The question has been raised whether any of the medications given directly postpartum influence the occurrence of pulmonary embolism. Although most of the cases were given one of the ergot preparations by mouth, only a few received pituitrin hypodermically.

When we analyze the types of deliveries, we find that six patients were delivered normally, seven by forceps (one low and six medium), seven by abdominal cesarean section, two by breech, and two by version and breech. In two of these operative deliveries, Voorhees bags were employed, while in other cases a manual curettage, a median episiotomy, and tamponade of the uterus were done once. We see from this that the incidence of pulmonary embolism in operative deliveries is three times greater than in normal spontaneous deliveries. Of the twenty-four cases delivered, sixteen or 66.6 per cent died, and of these twelve or 75 per cent had been delivered by some operative means. This would be another argument in favor of permitting the natural forces to terminate labor whenever possible, and an argument against operative interference, except when such interference is absolutely necessary.

During the five-year period covered in this discussion, the combined number of cases delivered at Sloane and the Woman's Hospitals was 13,716. Of this number 441 or 3.2 per cent were delivered by abdominal cesarean section and there were 103 cases of all varieties of placenta previa, giving an incidence of 0.75 per cent. Among the 441 abdominal cesareans done, seven cases showed evidence of pulmonary embolism, or more than 1.5 per cent, and two of these died. Among the 103 patients having some variety of placenta previa, two developed evidence of pulmonary embolism (1.9 per cent) and both died. We have seen previously that the incidence of pulmonary embolism in pregnancy is about 0.1 per cent, but among the cesarean cases it is about 1.5 per cent, and among the cases of placenta previa it is about 2 per cent. It is generally admitted that in these two

types of cases we see more hemorrhage than in other deliveries, therefore, we may assume that excessive bleeding during the labor or the delivery is a predisposing cause to pulmonary embolism. This opinion is further supported by the fact that when blood counts had been made prior to, or just after the development of the signs of pulmonary embolism, the red blood corpuscles were never found in excess of 3,400,000 and more commonly between 2,200,000 and 3,000,000, while the hemoglobin was between 45 and 55 per cent.

Let us now consider the onset, duration and prognosis of pulmonary embolism. In our series of twenty-four cases at the time of labor or in the puerperium, we find that six cases developed this condition at the time of delivery, or within two hours after delivery, of whom four died, and two additional cases occurred within the first twenty-four hours. Between the third and ninth days postpartum there were seven cases, and a like number between the twelfth and twentieth days. Two cases developed between the twenty-sixth and twenty-eighth days. Regarding the duration of the signs or symptoms we note that sudden death, that is, death within five to twenty minutes after the onset, occurred in ten cases or 42 per cent, and in eleven patients the signs or symptoms persisted for a week or less, while in only three cases was the duration in excess of this time. In speaking of the origin of emboli, mention was made of the possibility of a recurrence or secondary embolus. It was stated that when it did recur it was during the time of liquefaction and softening of the thrombus. In our series, we had two cases of secondary embolism, once in a cesarean with sterilization, the primary embolus occurring on the twenty-eighth day postoperative, and the secondary embolus occurring twenty days later. In this instance, signs of phlebitis were noted on the forty-first day after operation, or one week before the occurrence of the secondary embolus. This patient died. The other case of recurrence was that of a patient normally delivered, the primary embolus occurring on the sixteenth day after delivery, and the secondary embolus eight days later. This case recovered.

In the entire series of thirty-six cases in both the early months of pregnancy, and at or near fullterm, signs of phlebitis were recorded in only four patients, the saphenous veins being the site in each case, the signs developing in two cases before the embolus, and in two cases after. It is interesting to note that the two patients who had a secondary embolus showed evidence of phlebitis.

Considering for a moment the prognosis for a patient who has developed evidence of a pulmonary embolus, we have found from our study of the thirty-two cases that death occurred in twenty-one. Of this number, fourteen died within one hour after the first sign or symptom, nineteen died within twenty-four hours from the onset, and only two patients died subsequently, one on the twenty-fourth day,

and one on the forty-eighth day, the latter being one of the two cases who had a secondary embolus. From this it is seen that 70 per cent of the cases which terminated fatally died within one hour after the onset of symptoms, while 90 per cent died within twenty-four hours, and only 10 per cent died after the first twenty-four hours.

It is to be regretted that permission for autopsy was obtained in only three of the twenty-one deaths, but it is gratifying that in these cases the antemortem diagnosis was confirmed at the necropsy. In only one protocol was mention made of inspection of the condition of the veins in the pelvis or lower extremities, but in this single instance an embolus was found in the pulmonary artery and thrombosis of the right femoral vein was noted together with thrombosis of the superficial varicose veins of both legs.

Concerning the treatment of pulmonary embolism, little may be done after the condition has developed, other than the use of sedatives, especially morphine and the usual cardiac stimulants. However, in view of the fact that we have seen this condition arising in so many patients with anemia, preventive treatment is of primary importance. This anemia may be treated by hygiene and the iron and arsenic preparations and by transfusions during pregnancy, especially before the onset of labor. In cases which have hemorrhage at the time of delivery, immediate transfusion may also reduce the incidence of pulmonary embolism. In order to overcome the circulatory stasis following delivery, elevation of the foot of the bed and spiral bandaging of the lower extremities from the feet upward might also help to decrease the occurrence of this uncommon complication.

In cardiac patients, and in cases with very marked relaxation of the abdominal walls pressure exerted by some form of abdominal support would seem to be indicated. Under the direction of the late Dr. Studdiford, at Sloane Hospital, such cases were tightly strapped with adhesive tape, in order to aid in the restoration of intraabdominal pressure following delivery.

#### SUMMARY

Due to the infrequency of pulmonary embolism complicating pregnancy, labor, and the puerperium, it is impossible to formulate any definite conclusions from this small series. But, from this study of thirty-two cases which occurred in 31,716 pregnant patients, we may summarize as follows:

1. The incidence of pulmonary embolism was approximately 0.1 per cent.
2. The incidence of pulmonary embolism was three times greater in operative than in normal deliveries.
3. The incidence of pulmonary embolism was 1.5 per cent in all cases of cesarean section, and 2 per cent in all cases of placenta previa.
4. Secondary embolism was uncommon, occurring only twice in the thirty-two

eases; i. e., in about 6 per cent of the cases, and following the first embolus by at least two weeks.

5. The onset of the condition in the twenty-four patients delivered was immediate in six cases, in the first twenty-four hours in two cases, from the third to ninth day in seven cases, from ninth to twentieth day in seven cases, and after the twentieth day in two cases.

6. In the entire series of thirty-two cases the mortality was 65 per cent and in the twenty-four patients delivered the mortality was 66.6 per cent.

7. Of the cases which terminated fatally 70 per cent died within an hour from the onset of symptoms, and 90 per cent within twenty-four hours.

8. Treatment.—The usual sedative, supportive, and stimulative measures after the onset of the condition, but prophylactic in the direction of overcoming circulatory stasis, the development of greater aseptic technique, transfusions for anemia before the onset of labor, and in decreasing blood loss at the time of delivery.

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(For discussion, see page 654.)

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## AN ANALYSIS OF THE RESULTS IN 130 PREGNANCIES SUBSEQUENT TO CESAREAN SECTION IN 96 PATIENTS\*

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WITH the reduction in mortality as a result of improved technique during recent years, the number of deliveries by cesarean section has steadily increased. Formerly because infection was almost always to be expected with this method of delivery, it was justified only in cases of extreme pelvic contraction or when tumors so encroached on the parturient canal that it offered the only means of delivery. Such absolute indications are, of course, rarely seen even in large maternity hospitals.

While it is true that many of the added indications of today are justified, too often the decision to deliver by cesarean section is made because it is a supposedly safe and quick way out of some complicating condition. Rather than assume the responsibility of managing such conditions so that delivery through the natural passages might be accomplished the choice of delivery by cesarean section is adopted.

When we take into consideration the welfare of the mother during her future child-bearing period, cesarean section is a most serious procedure even in the hands of the expert operator.

There is no doubt that with the low morbidity associated with primary section we have a means of reducing the number of fatalities of childbearing. Nevertheless, its limitations should be known. It should not be used without definite indication because of the effect such an operation will have on the mental condition of the patient

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and her future pregnancies. The fear of a subsequent operation is often so strong as to prevent the patient from desiring to undergo the risks of another pregnancy. Holland, in a study of 1605 patients delivered by cesarean section, reported that of 1103 patients, 616 never subsequently became pregnant. Induced abortions are not uncommon among patients who have had one section.

The most frequent indication for primary section, as shown by the records of a large number of cases, is a moderate degree of pelvic contraction where disproportion between the size of the head and the pelvis was evident at the end of pregnancy.

The custom of making more frequent observations of these patients with moderate degree of contraction during pregnancy or of delaying operation until Nature has had a chance to bring about a possible normal delivery, would greatly tend to lessen the number of patients now being delivered by cesarean section.

In managing cases of placenta previa and accidental hemorrhage, other methods of delivery should have first consideration. Occiput posterior and eclampsia uncomplicated by contracted pelvis or other complications such as placenta previa should rarely require cesarean section.

Today, when cesarean section is performed for such a variety of indications, the problem of managing these cases in subsequent pregnancies deserves more consideration than it is receiving. A repeated section is almost invariably performed because of the fear of rupture with the development of uterine contractions. This fear of rupture is not based on our present-day knowledge of the anatomy of the scar but is more a relic of the days when the scar was in almost all cases imperfect as a result of the infection which was to be expected following such operations.

A great deal of study has been given to the anatomy of the uterine scar from specimens of uteri removed at time of rupture or because of other reasons in patients who had had a cesarean section. The process of healing and the strength of the scar have also been studied by experimental work on animals.

In this country Williams, in 1917, published his work on the study of the scar in ten uteri removed following a previous section. Gamble, from the same hospital, in 1923 reported further studies on eleven additional cases. The clinical analysis of a large number of cases of ruptured uteri reported during the past five years has added much to our knowledge not only as to the incidence of rupture but also the causative factors of imperfect healing.

It is the common belief of all authorities that in every case where proper apposition of the uterine muscle is obtained and no infection follows, the resultant scar is replaced by normal muscle tissue.

In such cases the structure and function of the uterus is not im-

paired, and there should be no fear of rupture from overdistention during future pregnancies or from the changes in structure which are brought about by labor pains.

Infection which destroys the muscle tissue by necrosis is the most frequent cause of the imperfect scar. The thin area forming part of or the entire scar may contain, in the future pregnancy, some muscle tissue, or be composed only of the peritoneum in contact with the lining decidua. The danger from rupture increases with the severity of the infection and the degree of the imperfection in the scar. Holland reported that in eighty-nine cases of rupture the entire scar was involved in sixty-seven cases, a small area in twenty-two cases.

In the elective cesarean infection is rarely seen when performed by the experienced operator. When the operation is done after a trial labor infection is more frequent if vaginal examinations have been made to determine the progress of labor and especially if there have been any attempts at delivery.

If a vaginal examination is necessary during a trial labor every precaution must be taken to prevent infection. In such cases we should be able to determine the progress by abdominal and rectal palpation. A trial labor should not increase the morbidity if the strength of the patient is watched and sepsis maintained.

A faulty scar may result from improper suturing. To obtain apposition so that firm union results the sutures must be properly spaced and include the entire muscle wall. The suture must not include the decidua. Necrosis may result in areas where the sutures are tied too tightly. Defective scars are rarely seen in cases where the wound is carefully closed by the experienced operator unless infection has occurred.

We have recently analyzed the records of 96 patients who had previously been delivered by cesarean section. These patients were admitted for subsequent pregnancies at the Manhattan Maternity, and during the past six years to the Obstetrical Service of the third division at Bellevue Hospital. All of the primary sections except twenty-two were performed at these hospitals.

It has been our policy for many years in managing such patients to allow selected cases to deliver by the natural passages. If the primary section was performed in some other hospital it was often difficult to obtain satisfactory knowledge of the condition of the patient during the puerperium. Temperature at this period does not always indicate infection of the uterine wall. Infection of the wound in the abdominal wall, alone, is not infrequent. In the febrile cases adhesions between the uterus and the abdominal wall are suggestive of an imperfect uterine scar.

If from evidence during the puerperium, or from examination of the abdomen during the subsequent pregnancy, there is evidence of a

possible defective scar, the method of delivery should be by repeated section. In such cases, if we are to avoid danger of rupture, the operation should be performed before the end of pregnancy because rupture is almost as frequent during the last month of pregnancy as it is during labor. In order to avoid the risk of premature onset of pains and overdistention the repeated section should be performed about the thirty-eighth week. Despite repeated warnings many of these patients do not seek hospital care until labor has already started.

Except where the primary indication was absolute, we consider that there is a possibility of delivery by the vaginal route for many patients in whom we find no evidence of the possibility of imperfect scar.

In the large group of patients who have moderately contracted pelvis conditions are often present in the subsequent pregnancies which make a repeated section unnecessary. In such cases it may be possible to have a normal delivery. I refer to the presence in the first pregnancy of a disproportion due to an oversized child or malposition or malpresentation.

There should be no question as to the method of delivery when the indication in the first pregnancy was for some temporary condition such as placenta previa or eclampsia.

In our analysis of the records of these cases we have considered in each case: age, para, type of delivery in each pregnancy, color, nationality, type of pelvis, indication for each method of delivery, condition of scar and character of adhesions at time of operation, postoperative course, duration of labor, size of child and the result to mother and baby.

Among the 96 patients there were 133 pregnancies following the delivery by the primary cesarean section. Twenty-two of the primary sections were performed in other hospitals. Of the 96 patients 76 required repeated section in 92 deliveries. Of these, four were performed in other hospitals. Two of the patients were delivered by spontaneous premature labor, seven by miscarriage and two by induced abortion. Thirteen of the 76 patients had two repeated sections and one patient three.

Twenty patients were delivered vaginally. Of these, four had two deliveries and one had six deliveries,—a total of thirty deliveries.

#### SUMMARY

A study of 96 patients with 133 pregnancies following cesarean section disclosed that 76 patients had 92 repeated sections,—five of these were performed in other hospitals. Twenty patients delivered vaginally at term in thirty pregnancies, four had two deliveries, and one had six deliveries. Twenty-two of the primary sections were performed in other hospitals. Two patients had premature deliveries

besides repeated sections. Seven had spontaneous miscarriage. Two had induced abortions.

TABLE I. ANALYSIS OF 76 PRIMARY SECTIONS WHICH HAD REPEATED SECTIONS

TYPE OF PELVES	NO.	LABOR		MORBIDITY	NO. OF REPEATED SECTIONS	SIZE OF BABY		MORB.
		ELECT	TRIAL			LARGER	SMALLER	
Generally contracted	30	19	11 cases 23 hr. average	0	37	14	8	4
Flat	27	21	6 cases 28 hr. average	1-7 days 2 slight temp. No trial lab. in any case	33	15	8	5
Funnel	7	5	2 cases 50 hr. average		8	1	4	0
Deformed	5	1	4 cases 13 hr. average	1 febrile for 8 days 7 hours trial labor	5	1	2	0
Generally contracted flat	3	2	1 case 48 hours		4	1	0	2
Naegele	1	1			1			0
Normal	2	1	Long trial		2			0
Amputated cervix	1	1			2			0
				5.4%				12.6%

*Indication for the Primary Section.*—Of 76 primary sections followed by repeated sections, there were fourteen of the elective group which had had one or more previous stillbirths due to operative delivery before they became elective in their following pregnancies. Eight of these fourteen had one previous stillbirth each, four had two previous stillbirths, one had four previous stillbirths and one had five previous stillbirths. Of those that had trial labors in their primary section, there were two that had had one stillbirth each for their first pregnancy.

TABLE II. FINDINGS AT OPERATION OF REPEATED SECTIONS

FINDINGS	NO. OF CASES
Moderate adhesions	10
Dense adhesions	8
Adhesive bands	4
Entire ant. wall of uterus adherent to parietal peritoneum	2
Ventral hernia—mesentery and omentum adh. to peritoneum	1
Dense adhesions interfering with operation	1
Scar thin at upper angle	3

*Findings at Operation of Repeated Section.*—At the time of the repeated section the condition of the scar and the presence of adhesions was noted. There was only one case of rupture. The rupture occurred in a patient who had infection following the primary section. The rupture occurred in a small area at the upper angle of the wound. A small portion of the detached placenta extruded. In three cases small areas of thinning were noticed. All occurred in cases where infection had been noted at the time of the previous delivery. The adhesions were sufficient to

be noted as moderate in ten patients, dense in eight, adhesive bands in four and in one case the adhesions interfered with the operation. The entire wall of the uterus was adherent to the parietal peritoneum in two cases. In one case the mesentery and omentum were adherent to a ventral hernia.

TABLE III. ANALYSIS OF PRIMARY SECTIONS WHICH HAD VAGINAL DELIVERY

NO. OF CASES	PELVES	CESAREAN			
		INDICATION	LABOR		
			TRIAL	ELECTIVE	?
4	Generally con-	Pelvis	1	2	1
4	tracted	Pelvis	4		
10	Flat pelvis	4 placenta previa		4	
	Normal	Eclampsia		1	
		Rigid cervix	1		
		Cyst of ovary		1	
		Large baby	1		
		Unknown			1
		Malpresentation	1		
2	Contracted out-	Pelvis		1	1
	let				

*Indication for the Primary Section.*—Of the twenty primary sections done in the cases which later on delivered vaginally thirty times there were six cases which had had previous vaginal deliveries. Three of these had primary sections because of

TABLE IV. CLASSIFICATION AND METHOD OF DELIVERY IN TWENTY PATIENTS DELIVERED VAGINALLY

	METHOD OF DELIVERY					SIZE OF BABY			
	SPONT.	INDUCT. SPONT.	BREECH VERSION	EXTRACT.	FORCEPS MID. LOW	LARGER	SMALLER		MORB.
Generally contracted		5		1			6	102	
			1				1	9 days	
					1			20 days	
	1					1			
Flat	1						1		
	1							Stormy	
	1				1				
					2	2		101	
								4 days	
Contracted outlet					1	1	1		
Placenta previa	1								
	1					1			
					2				
					1	1			
Eclampsia						1			
Rigid cer.					1			1	
30 hr. lab.									
Cyst of ovary	1								
Large baby	2							2	
Malpresentation	1					1			
Unknown					2	2			

placenta previa, one because of malpresentation, one because of large baby and one because of contracted pelvis. In the latter the section was performed because of the disproportion caused by a large baby.

#### MORTALITY

##### *Fetal* 1. *In Vaginal Cases*

One stillbirth, in second stage four and one-half hours.

##### 2. *In Secondary Sections* three cases or 3.4 per cent.

A. Ruptured uterus

B. Prematurity

C. Prolonged labor

##### *Maternal* 1. *Three deaths out of eighty-seven cases* giving 3.4 per cent.

A. Ruptured uterus

B. Ruptured wound of abdominal wall

C. Pneumonia and empyema, death one month after section.

*Mortality.*—In the twenty-nine patients delivered vaginally there was one stillbirth and no maternal deaths. This stillbirth occurred in a patient admitted in labor. The delivery was spontaneous with second stage of four and one-half hours.

In the patients who had repeated sections there were three stillbirths, a mortality of 3.4 per cent. One of these occurred in a ruptured uterus. The second, where the repeated section had been performed at the seventh month because of the onset of pains prematurely and the third in a patient admitted after a number of hours of labor at home.

*Maternal Deaths.*—There were three deaths in the eighty-seven cases operated upon, a mortality of 3.4 per cent. The first patient died of peritonitis following rupture of the abdominal wound, the second patient died one month following the section, from pneumonia followed by empyema and the third death was due to rupture of the uterus and shock. This patient was delivered for primary section in another hospital following long labor and oversized child. The convalescence was stormy. In the second pregnancy because of normal pelvis and smaller child she was allowed to attempt spontaneous delivery. After twelve hours the patient went into shock. Immediate cesarean, with transfusion, failed to revive the patient and she died three hours later. This patient, owing to the history of the previous pregnancy, should have had a repeated section before labor started.

#### CONCLUSIONS

The number of cesarean sections could be greatly reduced by more frequent observation during pregnancy, and the use of trial labor in doubtful cases of moderately contracted pelvis.

When cesarean section becomes necessary for delivery the risks in future pregnancies are greatly lessened, if the operation is properly performed.

In subsequent pregnancies when we may expect firm union in the uterine wall, a repeated cesarean should not be performed without definite indication.

If repeated section is decided upon as the method of delivery it should always be performed before the end of pregnancy.

## TREATMENT OF MENSTRUAL DISORDERS BY ROENTGEN RAYS\*

By A. J. RONGY, M.D., NEW YORK, N. Y.

AT THE meeting of this Association in 1925, I made a preliminary report on the use of roentgen rays in the treatment of menstrual disorders. At that time I pointed out the difficulty with which the gynecologist is confronted in carrying out this treatment, because the average patient as a rule is fearful lest the "x-ray" should stop the menstrual function.

The results obtained in the first series of cases were sufficiently encouraging to warrant the continuation of this treatment, especially in those patients who suffer from a scanty and irregular menstrual flow and who show no evidence of infection in the genital tract.

The manner in which the radiation acts on the ovaries is still not clearly understood; the entire subject for the present must be considered from the standpoint of clinical results only. Many theories have been advanced to explain the peculiar response of the ovarian tissue to small doses of radiation. Some are plausible and harmonize with the action which the roentgen rays have on cellular function. Withal that, none of the theories so far promulgated give an intelligent interpretation of what actually takes place either in the ovarian stroma or the follicle.

Loeb maintains that there are two factors in the sexual cycle. The first factor is ovarian and is not associated with the corpus luteum. The wall of the maturing follicle secretes a substance which affects the circulation and growth in the uterine walls, mammary glands, and vagina, and in a manner is responsible for the changes in the ovary itself. These changes finally culminate in ovulation, which leads to corpus luteum formation. The second factor in the cycle is controlled by substances secreted by the corpus luteum. These secretions sensitize the uterus, make possible the formation of decidual and predecidual proliferation, and facilitate the fixation and development of the fertilized ovum.

What part of the ovarian structure is more readily affected by radiation is as yet unknown. Histologically there is no difference in the sensitiveness of the different ovarian cellular structures to the roentgen rays, and therefore we cannot conclude that a particular portion of the ovary is especially affected. Apparently the various

\*Read at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, held in Chicago, Ill., September 22, 1925.

parts of the ovary: cortex, medulla, and follicle, are similarly affected by small doses of irradiation. The clinical results obtained by small doses of radiation must necessarily be produced by the action of the roentgen rays either (1) on the uterine mucosa, (2) the ovarian stroma, or (3) the graafian follicle (unruptured), and (4) ruptured follicle.

Physiologists generally concede that the periodicity of menstruation is controlled by the regularly recurring cycles of changes in the ovary, although the actual relation of cause and effect between follicular rupture and uterine changes has as yet not been established beyond all doubt. It is, however, generally accepted that the corpus follicularis from the moment of its rupture is a chemically active body until its period of involution. It may be that the follicle acts as an inhibiting body only, through the involution of which the remaining follicular apparatus can return to full function.

Aschoff has shown that the ovum leaves the follicle without a trace of hemorrhage, and that the follicle grows and reaches its greatest development in about fourteen days after ovulation. It is only coincident with the uterine bleeding that a characteristic hemorrhage takes place in the follicle, which initiates degeneration. He maintains that the inhibitory function ceases when the retrogressive changes produced by the hemorrhage are well advanced toward the end of the third stage or fourteen days after the hemorrhage has taken place into the follicle and then another follicle ruptures. If for some reason the menstrual hemorrhage does not take place in the follicle, the degeneration of the luteal cell does not occur, and the follicle behaves as the corpus luteum of pregnancy; the luteal secretion delays the retrogression of the follicle, follicular rupture does not take place, ovulation does not occur, and menstruation is absent.

I am inclined to believe that further investigation will demonstrate the fact that the action of the radiation is to produce degenerative changes in the corpus luteum, which hasten the involution, and therefore remove its inhibitory action for a new ovulation and the associated premenstrual changes in the uterus, which fourteen days later result in menstruation. This is in agreement with Rhodenburg's investigations. He points out that premature hyalinization of the vascular supply of the corpus luteum retards the recession of the corpus follicularis. When the detritus of the luteal cells is not completely removed, ovulation and menstruation are delayed.

H. B. Matthews, who conducted a series of experiments on the ovaries of rabbits, also observed that the corpus luteum was the last element to be destroyed by irradiation. The preponderance of scientific investigation on the action of radiation on the ovaries seems to point out that the follicular portion is more sensitive than any other ovarian tissue.



Flatau is of the opinion, however, that the roentgen rays produce an irritation upon the hypofunctioning ovary, which is of a functional character. Sippel believes that the ovaries are stimulated into action by the roentgen rays and that they liberate a special hormone, which activates the function of menstruation.

Holzknecht irradiated the ovaries of young guinea pigs and found on histologic examination definite changes in the ova, follicles, and stroma. The uterus was also markedly hypertrophied. He is of the opinion that these uterine changes were due to the action of a hormone.

Further investigation of the action of roentgen rays on the ovaries will be necessary before it can be finally determined what part of the ovary is actually affected. So far the whole subject has to be approached from a purely empirical aspect. We are confronted with a clinical condition, that of irregular and scanty menstruation, in a group of women who usually are sterile and who present constitutional characteristics, which are typical of that group. These patients are not helped by the usual remedies.

Patients who were benefited by any other method of treatment were not subjected to irradiation. Only those who failed to respond to any treatment were subjected to it. All of the patients suffered from either primary or relative sterility in addition to the deranged menstruation. They really formed a group of women in whom the menstrual disturbance was severe and medicinal treatment was of no

#### ANALYSIS OF CASES

Total number of cases: 36.

<i>Ages</i>		
16 to 20	-----	1
21 to 25	-----	10
26 to 30	-----	16
31 to 36	-----	6
36 to 40	-----	3
Total	-----	36

} 26

#### *Successful Cases:*

Total number of cases: 22.

Regular menstruation—no pregnancy---- 14

Regular menstruation—pregnancy----- 8

<i>Ages:</i>	<i>Cases:</i>	<i>Ages:</i>	<i>Cases:</i>
21 -----	2	16 to 20 -----	0
22 -----	1	21 to 25 -----	6
23 -----	2	26 to 30 -----	13
25 -----	1	31 to 35 -----	2
26 -----	4	36 to 40 -----	1
27 -----	2	Total -----	22
28 -----	2		
29 -----	1		
30 -----	2		
31 -----	1		
35 -----	1		
37 -----	1		

} 19

Case No.	Age	Para	Interval between last menstruation and treatment	Interval between treatment and result	Comment
1	21	0	9 months	5 weeks	Regular. Reduction in weight.
2	27	0	8 months	10 weeks	Regular for 8 months. Pregnancy; normal birth.
4	24	0	4 months	4 weeks	Amenorrhea for 18 months prior to marriage. Regular for 10 months. Pregnancy.
6	21	0	4 months	4 weeks	Regular for two months. Pregnancy.
12	34	1	17 months	4 weeks	Regular. Weighed 220 lbs. Reduction.
11	30	0	3 months	8 weeks	Regular. Profuse.
15	27	0	4 months	4 weeks	Regular; pregnancy; premature birth.
16	35	0	8 months	16 weeks	Regular. Two series; last 50.
17	30	2	3 months	4 weeks	Regular. Pregnancy; birth normal.
18	26	0	6 months	4 weeks	Regular.
20	29	0	5 months	4 weeks	Regular.
21	30	0	36 months	7 weeks	Regular, but scanty.
22	28	0	18 months	4 weeks	Regular.
24	28	0	24 months	4 weeks	Regular.
25	26	0	5 months	4 weeks	Regular. Pregnancy (unterminated).
26	37	0	72 months	4 weeks	Regular; 5 days each period.
27	22	0	6 months	7 weeks	Regular.
29	26	2	1 month (1-day menses)	3 weeks	Regular; three days.
32	25	0	2 months (4-month menses)	2 weeks	Regular.
33	24	0	7 months	7 weeks	Regular. Reduced weight, 47 lbs.
35	26	0	7 months	7 weeks	Regular. Pregnancy (unterminated).
36	30	0	1 month (previous interval 7 m.)	4 weeks	Regular.

avail. Roentgen ray therapy was suggested to them on the theory that there was nothing else left to do and that this form of treatment might benefit them.

The results obtained in this series of cases prove conclusively that radiation definitely induces ovarian activity, as shown by the marked improvement that has taken place in the function of menstruation as well as the induction of a higher grade of fertility in a certain number of patients.

During the past three years I selected thirty-six patients who suffered from scanty and irregular menstruation, and referred them to Dr. I. S. Hirsch for roentgen ray treatment. The patients were carefully studied. Those in whom there was the slightest suspicion of an infection in the pelvis were eliminated. Only those cases were chosen

in whom the menstrual disturbance seemed to be of constitutional origin.

The diagnosis of the patient's condition was given to the radiologist. I believe this is important, because it is necessary that he should have a proper conception of the condition of the genital organs, so that he may carry out the treatment in an intelligent manner.

#### PREGNANCIES

Eight of the patients became pregnant subsequent to this treatment. I shall report in detail the clinical histories of these cases, as I believe that it will help to indicate the type of case that was subjected to radiation. All children born at full-term were normal and continued to develop normally, showing that the action of roentgen rays has no effect on the development and growth of the child.

CASE 1.—H. K., consulted me May 25, 1921. She was twenty-seven years old, married five and one-half years. No illness during infancy or childhood, except measles at the age of four years. Sexual history normal. Weight normal; general condition good. One child, four years old. Had had an abdominal operation.

She gave a history of menstruating every 2 to 3 months; flow was scanty and of short duration. She suffered from flushes and headaches. Vaginal examination disclosed a small, hard uterus, right ovary enlarged and cystic, left ovary apparently normal, vaginal vault relaxed, and cervix slightly lacerated. I prescribed ovarian substance in combination with pituitary extract, and instructed her to come back two months later. She returned July 6, 1921, and reported no change in the menstrual function. I instructed her to continue to take the same medicine.

On March 27, 1922, she called again, giving a history of not having menstruated since March 16, 1921, and suffering from severe headaches and flushes. I referred her to Dr. Hirsch for treatment. After having received three treatments, she menstruated April 30 and May 27. She called again July 20 and upon examination she was found to be pregnant. The pregnancy continued normally and she gave birth to a living, well-formed child February 21, 1923.

CASE 2.—B. D., thirty-three years of age, married eleven years, consulted me May 24, 1922, because she had not menstruated in eight months. General condition good; no disease of infancy or childhood. She menstruated first at fifteen years, five days. She always menstruated irregularly every two to five months. Sexual history normal. Husband thirty-seven years of age; semen apparently normal.

Vaginal examination: Vagina small, cervix nipple-like and situated high in the vagina, uterus small, anteфлекed and hard; left ovary contained small cyst, right ovary apparently normal. She was given the usual remedies.

On June 14 the patient reported that she had not menstruated as yet. She was referred to my associate, Dr. M. J. Goodfriend, who gave her hypodermic injections of lutein extract. She responded to this treatment, menstruating in August and September. January 3, 1923, she reported that she had not menstruated since Nov. 6, 1922. I gave her ovarian and thyroid extract. But the menstruation did not appear.

Nov. 4, 1923, she reported that she had menstruated June 19, last, and that she had severe pain in the vagina for the last four weeks. She was referred for x-ray treatment. She was given treatments on June 30, July 1, 3, and 8, 1924. She men-

struated Aug. 9, Sept. 4, Oct. 3, and Nov. 4. She consulted me again May 18, 1925, and reported that, since she had received the roentgen-ray treatments, she had menstruated regularly every four to five weeks. April 3, 1926, she called again, stating that she had menstruated last Oct. 26, 1925. Upon examination I found that she was pregnant four and one-half months.

CASE 3.—B. M., twenty-six years of age, married five years, never pregnant. She menstruated first at twelve, irregularly, every three to four to six months. Mother had five children, all well. No consanguinity; no dyspareunia; sexual anesthesia. Husband twenty-seven years of age; semen normal.

This patient consulted me Sept. 17, 1923, giving the following history: She menstruated Aug. 4, and before then seven months ago. She had been dilated and a stem pessary had been inserted into the cervix three years previously, but it had not improved the menstrual function. The oviducts had been tested for patency and found to be open. She had received injections of lutein extract by her family physician, but she had not been helped by it.

Vaginal examination: Vagina normal, cervix small, small fibroid in the anterior wall of the uterus, right ovary enlarged and cystic, and left ovary apparently normal.

She had gained 40 pounds during the past year. Blood pressure 170. Urine contained heavy traces of albumin and some hyaline casts.

She received roentgen-ray treatments Dec. 3, 5, 10, and 12, 1923. She menstruated Jan. 22 and Feb. 24, 1924. Sept. 24 she consulted me again and stated that she menstruated last April 1. On examination I found her pregnant five months. The nephritis became more marked during the pregnancy. Oct. 17 she gave birth to a premature, stillborn child.

She became pregnant again in March, 1925, and gave birth to a viable child, Dec. 11, 1925.

CASE 4.—T. K., twenty-seven years of age, married three years, gave birth to a normal child one year after marriage. Baby died of spinal meningitis.

I saw her in consultation with Dr. Breinin, Jan. 18, 1923. She gave a history of not having menstruated for nine months, and considered herself pregnant and was preparing for the lying-in period. Vaginal examination showed uterus to be of normal size. The diagnosis of pseudopsia was made.

She came to see me May 26, 1924, stating that she menstruated last Feb. 24, and that she stained on May 23. She was given roentgen-ray treatment May 28, 29, 31, and June 6 and 8. She menstruated July 4, duration eight days, and again Aug. 2. On Oct. 13, 1924, she was found to be pregnant two months. Jan. 15, 1925, pregnancy was progressing normally. Her physician later reported she gave birth to a normal baby.

CASE 5.—F. G., consulted me March 14, 1923. She was twenty-four years of age, married four years, never pregnant. Had scarlet fever when six years of age. Menstruated first at fourteen, irregularly, every two to four months. Before her marriage she had not menstruated for eighteen months. Menstruation reappeared every two to four months after marriage. She had last menstruated four months previously. She had been dilated three years earlier. Complained of lack of sexual *libido*. Husband twenty-four years; semen normal.

Vaginal examination: Vagina normal, cervix conical and long, body of uterus small, right ovary prolapsed and tender, and left ovary apparently normal.

She was given roentgen-ray treatment April 26, 27, and 30, 1923; she menstruated five weeks later and thereafter every month. April 2, 1924, vaginal examination disclosed a uterus the size of a three months' pregnancy. The pregnancy progressed normally and she was delivered of a normal child at full term in November, 1924.

## FAILURES

Case No.	Age	Para	History	Remarks
3	36	2	Menses irregular; three times in five years.	Failure due to age. Probably premature menopause.
5	21	0	None for three months.	Insufficient treatment. Inflammatory process in pelvis.
7	27	0	Always irregular. Last menses eighteen months previous.	Atrophic cystic degeneration of the ovaries.
8	24	0	Once at six; once at sixteen. Stained once four months after marriage. Had flushes some time. Sexual anesthesia.	Congenital ovarian deficiency. Uterus small and retroverted. Left ovary not palpable. Tried diathermy.
9	29	0	Always irregular; becoming increasingly so.	Amenorrhea one year.
10	36	0	Twelve times in last eighteen years. Had flushes some time ago. Last menstruation six years before treatment.	Ovaries not palpable. Dark skin. Hypertrichosis. Defective development of the generative organs.
13	31	1	Always irregular. Last menstruation eight months previous.	Cause of failure unknown.
14	26	0	Always irregular. Last menstruation eleven months before treatment.	Congenital ovarian deficiency.
19	18	0	Always irregular. Last menstruation nine months previous.	Congenital retroversion.
23	30	0	Stained for the last seven years, with pain.	No change; same as before treatment. Infection following miscarriage seven years previous.
28	22	0	Irregular for sixteen months. Fibroid uterus.	Cramps; no result. Cause: probably beginning fibrosis.
30	23	0	Sterility. Menstruation regular.	Small hypoplastic uterus. Sexual anesthesia.
31	23	0	Always irregular. Last menstruation five months previous.	Probably cyst of ovary.
34	31	0	For sterility. Menstruation scanty; one day.	Menstruation returned, four days' duration. Normal amount. Sterility unchanged.

Total number of failures ----- 14

Ages	Cases
16 to 20-----	1
21 to 25-----	5
26 to 30-----	4
31 to 35-----	2
36 to 40-----	2
Total -----	14

Failures due to premature menopause (?)----- 2 cases  
(Case 3, age 36; Case 10, age 36.)Failures due to congenital deficiency or genital tract development----- 6 cases  
(Cases 7, 8, 9, 14, 19, and 31.)Failures due to unknown cause----- 1 case  
(Case 13, age 31.)Unsuitable for treatment ----- 3 cases  
(Case 5, pelvic infection; Case 23, pelvic infection; Case 28, incipient fibrosis.)Sterility ----- 2 cases  
(Case 30, undeveloped uterus; Case 34, menstruation returned to normal. No pregnancy.)

CASE 6.—J. B., twenty-six years, married four months, began to menstruate at fifteen; she then stopped for eleven months. Had headaches, "flushes," and nausea. She consulted me Dec. 16, 1924, because she had not menstruated since July 16. Previous to that she had menstruated every two to three months. She began to have dizzy spells and to gain a great deal of weight, 40 pounds during the past year.

She received roentgen-ray treatment Dec. 6, 8, 10, and 11. She menstruated Jan. 12, 1925. April 24, 1925, she reported that she had menstruated regularly every 29 to 30 days and for 4 to 5 days, moderate flow, without pain.

July 13, 1925, vaginal examination disclosed an enlarged uterus, the size of a ten weeks' pregnancy. The pregnancy progressed normally, and she was delivered of a full-term baby on Feb. 6, 1926.

During the seventh month of pregnancy she developed a double pneumonia. She made a complete recovery and is now well.

CASE 7.—A. B., twenty-seven years, married three years, puberty at fifteen, was pregnant one year after marriage, miscarried in the third month and was curetted. She consulted me March 26, 1923, because she had not menstruated since August, 1922, and also because her menstruation had been irregular since the miscarriage.

She received radiation April 11, 12, and 16. She menstruated regularly June 23, 1923. The menstrual function has been normal since. She became pregnant and gave birth to a normal child in March, 1924.

CASE 8.—A. F., twenty-four years, never pregnant, menstruated at fourteen, every month until she married; then menstruation appeared only every six to eight to eleven weeks, flow scanty. She had been dilated and curetted three years before I saw her and since then had menstruated every 8 to 12 weeks.

She consulted me Sept. 27, 1924, for irregular menstruation and sterility. I gave her the usual remedies. She returned Jan. 1, 1925, and stated that she had not menstruated since Sept. 22.

She was given radiation in March, receiving five treatments, after which she menstruated regularly in April, May, June, and July. Sept. 23 she called again because she had not menstruated since July 15, and upon examination I found her pregnant eight weeks.

That pregnancy ensues in a number of these patients subsequent to irradiation is clearly pointed out by Matthews, who has collected the reports of 874 women from all parts of the United States who were given irradiation during the child-bearing period. Twenty of these patients gave birth to normal babies at full term, fifteen miscarried or aborted, and three gave birth to premature babies. I. C. Rubin reported nine pregnancies following the use of mild doses of roentgen rays.

Clinical medicine is both an empirical and interpretive science. Some of the greatest advances in the science of medicine have been primarily brought about by empiricism and clinical observation.

The apparent results obtained in these cases may act as a nucleus for scientific investigation of the action of roentgen rays on the ovaries in relation to menstruation and fertility.

# STRUCTURE AND FUNCTIONS OF THE ENDOCRINE GLANDS, PARTICULARLY OF THE OVARY\*

BY PROF. DR. L. FRAENKEL, Breslau, Germany

**E**IGHT glands have been recognized as endocrine: the hypophyseal, suprarenal, thyroid, parathyroid, the pineal bodies, the pancreas, the thymus and the genital glands. The pancreas and the genital glands possess an ineretory and exeretory secretion. The pineal bodies and the thymus have a limited period of activity. They become inactive when the sex glands begin to function. The pituitary, suprarenal, thyroid and parathyroid glands are of vital importance throughout life. Total removal of any one of these leads to death.

The importance of the endocrine glands became apparent when diseases due to pathologic changes, or those produced experimentally, were observed, such as aeromegaly, adipose-genital dystrophy, Addison's disease, myxedema, hyperthyroidism, tetany, diabetes mellitus, precocity, infantilism, eunuchoidism, hermaphrodism, osteomalacia and so forth.

The size of the endocrine glands does not correspond to the importance of their functional activity. The thyroid gland forms the only exception. Ductless glands are small, well-defined structures, sharply separated from the adjacent structures. At first glance the histologic structure seems to vary in each one of the glands. They possess, however, one common characteristic, namely, the intimate relation of the capillaries with the large secreting cells.

Endocrinology had hardly been established when attempts were made to identify it with the humoral pathology flourishing in the medical era preceding that of modern cellular pathology. An internal secretion of a number of other organs was also advocated, as the bowels, the muscles, the uterus, the breast. Each organ, yes each cell, gives off substances into, and receives some substance from, the blood. These activities, however, cannot be compared to the sharply specified functions of the truly endocrine glands, which consist in the continued excretion of a specific substance of high pharmacodynamic activity into the blood stream.

Attention is called to the fact that different parts of an endocrine gland may secrete substances of varying character as the hypophysis (anterior and posterior lobe); the suprarenals (cortex and parenchyma); the bronchiogenic organs (thyroid and parathyroid); the ovary (corpus luteum and interstitial gland).

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\*Read by invitation at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, held in Chicago, Ill. September 26-27, 1926.

This paper will deal with the internal secretion of the ovary. The endocrine activity of the male sex gland has been hypothetically propounded by Brown-Séquard, and that of the female sex gland by Knauer-Halban by means of transplantation experiments. I succeeded in discovering the hormone producing portion of the ovary, the existence of which had been predicted by Prenant and Born some time preceding my experiments. The yellow body possesses the generally recognized function of preparing the uterine mucosa for the reception and insertion of the impregnated ovum. I proved this in the rabbit. By very many elimination and control experiments I also showed that an existing pregnancy was for a certain length of time dependent for its continuity on the presence of a yellow body. Later I was able to make the statement that all the cyclic processes in the female which lead to, but do not always result in the insertion of an impregnated ovum, are dependent on the yellow body. This statement has frequently been misinterpreted. Perhaps I did not express myself with sufficient clearness in my first reports. In the last sentence printed in spaced type, however, the statement was made, "Menstruation is caused by the secretory activity of the corpus luteum. It is not caused by the pressure of the maturing and growing follicle on the ovarian nerves, but by the action of the yellow body. The latter brings about the cyclic hyperemia of the uterus in intervals of four weeks, which terminates either in a pregnancy or a menstruation." The pregravid and premenstrual changes of the mucous membrane of the uterine canal have been recognized by the writer as the function of the yellow body, which is automatically succeeded by the menstrual flow, if pregnancy did not occur. This statement is expressly made to refute the erroneous assertion, often met with in literature, that Loeb deserves priority for the correct interpretation of these facts, while I wrongly considered menstruation as the function of the yellow body.

The ingenious experiments of Loeb were carried on with an entirely different object in view. He thereby demonstrated that in the guinea pig, having a yellow body, the action of the decidua to surround an impregnated and implanted ovum, the circumvallating impetus, is not limited to the latter but includes all foreign bodies deposited on the decidua. Another proof for the function of the yellow body was thus shown, for which Loeb deserves unstinted praise. Hartmann found that in the opossum, a nondeciduate, the yellow body is instrumental in causing imbedding of the ovum, but the circumvallating power is not the main function of the yellow body, for Hartmann found also that in nondeciduates the implantation of the ovum is also originated by the corpus luteum.

All these experiments were carried on in animals. The proof of the existence of these laws in man cannot be performed by such experi-



mentation. No doubt they also apply to the human race. To make practical use of these findings in the treatment of certain diseases as hypoplasia, sterility, abortion, amenorrhea, and so forth, biochemical tests had to be developed which seemingly have proved successful.

Fellner and Herrmann, Allan with Doisy, and investigators from many countries have published the results of valuable investigations on (1) the preparation of ovarian hormones, and (2) the use of the vaginal epithelium of rats as a standardizing medium. They all agree that the internal secretion is contained in (a) the yellow body, (b) the follicle fluid, and (c) the placenta. Thus the question is raised whether the graafian follicle and the placenta are organs of internal secretion.

Let us first discuss the placenta. The microscopic examination of the fully developed placenta shows huge spaces filled with large quantities of blood. These spaces are separated by a single layer of flat cells of an endothelial character. It forms an osmotic membrane for the diffusion of products of nutrition and tissue-waste. These cells are derived from the two-layered, well-developed chorion epithelium and evidently have been compressed to a flat, single-layered membrane by the blood stream. They do not contain a trace of lipid bodies or even protoplasm. The histologic picture cannot be regarded as that of an organ of internal secretion. The fully developed placenta is not a hormone producing organ but a depository for a hormonal secretion. It is known through my investigations and those of Loeb, and others, that the mucosa of the genital canal is the primary place of activity of the ovarian hormone, expressed in the formation of a decidua through the function of the yellow body. It is highly probable that the secretion of the yellow body may also have been deposited in the decidua. Therefore the decidual portion of the placenta should contain the hormone. The decidua surrounds the placenta in a basal and capsular layer and traverses in every direction the entire placenta. It, therefore, occupies a large part of the solid portion of the placenta. It is evident that the entire placenta acts as the depository of the ovarian hormone. With the assistance of Fels, I have compared the action of the retroplacental and umbilical blood on the classical test object, the vagina of the castrated white mouse, to determine whether the blood from the maternal side of the placenta contains a greater amount of the hormone than the infantile side. But no difference was found, maybe the test object is therefore not sensitive enough.

Further, the ovarian hormone has been biologically detected in the follicle fluid and, therefore, the graafian follicle has been considered as an endocrine organ. If the histologic structure is studied, it is seen that the follicle is surrounded by a many-layered theca externa, which includes the rightly vascularized theca interna. This layer harbors already quite a large number of larger epithelioid cells. The

membrana granulosa is seen internally to the theca interna. The cells of the former are still small and surround the ovum. This layer encloses the follicle fluid which contains the hormone. Zondek proved on the biologic test object that the hormone is delivered from the theca interna and not the membrana granulosa. This finding must still be verified by other investigators. It does not contradict our pathologic or physiologic knowledge. It is known that the wall of a follicle, not yet ruptured, has already a yellowish hue due to deposition of the lutein coloring substance. It is also known that in puerperae, and women with other forms of amenorrhea, such as functional amenorrhea, osteomalacia, myomata, the theca interna shows marked proliferation (small cystic degeneration). In extrauterine pregnancy, hydramnios, hydatid mole and malignant chorioepithelioma, it has been observed that lutein cysts, lutein cells and pseudolutein cells (so-called theca-lutein excrescences) and even large, multilocular cysts may replace both ovaries. Kreutzmann and I were able to note the formation, Krömmner and I, the resolution of such pseudolutein cysts. All these formations are due to the increased proliferation of the follicle wall in order to substitute or support the yellow body during pathologic states. It must be assumed that the graafian follicle is not as yet an endocrine gland but commences the change toward it, and that the first hormonal secretion begins to form but remains at first within the liquor folliculi and that the external theca still prevents the hormone from entering the organism.

A connection of the hormone with the blood is established as soon as the follicle ruptures and undergoes the change to the corpus luteum which produces an enormous amount of hormone during a few days or weeks. The latter enters the blood stream on account of the intimate interlacing of lutein cells and capillaries. If the yellow body alone would be entitled and be capable of functioning, then sex hormone production would be absent in the nonpregnant state for several days each month and during pregnancy for several months, also before puberty and after the climacteric and in functional amenorrhea. Whence should the first estrum come, which in the animal precedes the first ovulation? Whence should libido in the nonovulating women be derived?

The permanent endocrine secreting organs consist of a combination of the follicles which during the four weeks' cycle are augmented by the yellow body and its added secretion. The interstitial gland in animal species is represented by this combination of follicles in man. The writer demonstrated that the interstitial gland is a proliferation of the cells of the theca interna in every conceivable form. The interstitial gland, especially in small multiparous mammals, and the formation of the atretic or nonmaturing follicles in the larger animals and in man, must be regarded as elementary and the corpus luteum as the

specific organ of collection and excretion. The latter gathers every four weeks all available hormonal powers for the specific purpose of nidation of the ovum. The highest type of endocrine gland is thus produced, a type to be found nowhere else in the organism. All other endocrine glands, as the pituitary, the adrenal, the thyroid, the parathyroid, even the reawakening thymus, and the insulin producing islands of Langerhans in the pancreas, aid the corpus luteum in the performance of its work, which is substantiated by the occurrence of hypertrophy and occasionally of hypoactivity evidenced in pregnancy, aeromegaly, hyperthyroidism, pregnancy, tetany, glycosuria, and so forth.

The newer investigations of Allan and others thus contribute to an increase in our knowledge of the internal secretion of the ovary. The science of general endocrinology is still full of imperfections and contradictions, although the fundamentals of the internal secretion of the female sex gland have been fairly well established, and are clearly outlined in their main features.

The reason for the exceptionally favorable position is that the ovary not only immaterially affects the general organism and its functions (metabolism, respiration, circulation, etc.), but almost exclusively rules the genital tract.

None of the other endocrine glands functions for one single part of the organism, but all for the whole. Only the germinal glands form an exception. Their study is greatly facilitated by the easily noted effects, both anatomic and functional, on the genital tract. Precisely because of this limited sphere of influence we may also, in our realm, soon expect success therapeutically through the use of concentrated hormones which, we hope, will soon be found.

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## THE MORBIDITY AND MORTALITY OF CESAREAN SECTION\*

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SUCH abundant statistics of morbidity and mortality of cesarean section have appeared during the last quarter of a century, that in the time allotted it is impossible to do more than touch upon certain investigations of special significance. It is hoped that this backward glance over the works of others, and the report of our own results will prove of value. Without an occasional auditor's report we are prone to recall readily our successes, but less vividly our mistakes.

Within the scope of this paper I purpose first, to include a résumé of the advance in cesarean section which has followed the general progress of surgical methods, the effects of improvements in the tech-

\*Read at a meeting of the Obstetrical Society of Philadelphia, October 7, 1926.

nie of the original operations proposed, and the results from operations of abdominal delivery recently introduced; second, to give the mortality of the operations performed in the generally accepted indications and also in certain indications which are much disputed; finally, to present the mortality of cesarean section as performed in the wards of the Obstetrical Department of the Jefferson Medical College Hospital during the past year.

I shall confine my remarks to the abdominal method of cesarean section, and will endeavor to incorporate mortality figures for both mother and child. The mortality of the mother merits our special consideration, however, for only exceptionally does the performance of the operation per se add to the fetal risks.

In the earliest period of which we have any knowledge the operation was performed upon the dead mother in the hope of saving a living child. The 100 per cent maternal mortality can scarcely be ascribed to the postmortem abdominal incision. We have no definite knowledge of the infant mortality in these cases, but considering the poor results that have attended this operation during the past century it is doubtful if as many as 10 to 20 per cent of the infants survived.

The first cesarean section on the living of which we have a detailed account, the operation performed successfully in 1500 by Jacob Nufer upon his wife, inaugurated a period from 1500 to 1876, during which the operation was performed as a last resort in the interest of the mother as well as the child. The uterus was incised and left unsutured after the delivery of the baby. Like most "last resort" operations, the mortality was appalling. Statistics of British operations from 1737 to 1860 collected by Professor E. W. Murphy of University College, show that the maternal mortality for the whole period was 84 per cent. Späth stated that up to the end of this period (1876) that there had not been a successful case of cesarean section in the great Lying-In Hospital of Vienna.

In 80 cases performed in the United States up to 1878, collected by Harris, 52.5 per cent of the women died. Such poor results were obtained by physicians that Harris in 1887 pointed out that the operation was more successful when performed by the patient herself or when the abdomen was ripped open by the horn of an infuriated bull. He collected nine cases of the latter from the literature with five successful recoveries, and stated that out of eleven cesarean sections performed in the city of New York during the same period, only one patient recovered.

With the introduction of the Porro operation in 1876 and the more general acceptance of the principles of antiseptic surgery as introduced by Lister in 1867, another period was inaugurated with improvement in operative results. Statistics showed a decrease of maternal mortality during the latter part of the nineteenth century

from 24.8 per cent to 15.4 per cent with the wide adoption of Porro's principles.

The latter operation, the Porro cesarean section, has a definite field of application today. The modification in technic of peritonealizing and dropping the stump of the uterus has still further reduced the mortality. Among the deliveries of the Chicago Lying-In Hospital from 1918 to 1925, it was employed 12 times with no maternal deaths. In the Obstetrical Department of the Johns Hopkins Hospital, the Porro operation was performed 70 times up to April, 1923, with but three deaths.

The introduction by Sanger, in 1882, of uterine sutures revolutionized the operation of cesarean section, introducing the so-called classical or conservative cesarean section so widely employed by the present generation. Certain modifications of the technic of this operation, e.g., the transverse fundal incision of Frank introduced in 1907, and the high abdominal incision and vertical fundal incision of Asa B. Davis, have played little part in reducing the mortality of the original Sanger method. Rather, the application of surgical principles of asepsis and operative technic, have been the chief contributing factors in reducing the mortality when the operation is performed in so-called clean cases. Up until 1910 the classical cesarean section held almost undisputed sway in the field of abdominal deliveries and today is still the most widely employed method of abdominal delivery. The statistics of cesarean section as performed during the twentieth century are based largely upon this type of procedure.

In an extensive study of cesarean section as performed in the British Empire from 1891 to 1910, Routh gives a maternal mortality of 2.9 per cent, when the operation is performed for contracted pelvis under favorable conditions. The mortality rate given by Holland-Kerr for cesarean section performed in the same district after 1910 is 1.7 per cent when the indication was contracted pelvis under favorable circumstances. An improvement of 1 per cent is noted over a period of a decade. H. R. Spence in a monograph on cesarean section gives as his total mortality for the operation performed 120 times during his hospital career, 3.3 per cent. The latter includes all the operations independent of the time of performance. In the classical cesarean section, DeLee reports four deaths in 88 operations, a maternal mortality of 4.5 per cent. In reporting the operations performed at the Johns Hopkins Hospital, J. Whitridge Williams divides his statistics in two groups; the first fifty with a maternal mortality of 12 per cent, and the succeeding 203 operations with a gross mortality of 2.45 per cent.

From these reports we may conclude that the maternal mortality rate for cesarean section of the present day is from 2 to 3 per cent,

when the operation is performed for contracted pelvis under favorable conditions, that is, as an elective operation, or very early in labor.

Interest is displayed in all parts of the world in the transperitoneal cervical cesarean section, and the literature is filled with reports and discussions. DeLee, a staunch advocate of the operation in this country, reports 390 low or cervical cesarean sections with three maternal deaths, a mortality rate of 0.76 per cent. Stoeckel in 1906 collected 194 cases of the cervical operation, of which 50 per cent were either frankly infected or suspicious, with three deaths. From a perusal of the literature on this subject, it is my impression that the mortality for this operation is considerably higher in the smaller groups of cases reported.

Such then has been the general improvement in the results of cesarean section,—from a maternal mortality rate of nearly 100 per cent in the middle of the nineteenth century to one of 3 or 4 per cent in the second decade of the twentieth century. Of equal or greater interest is the study of the mortality of the operation when applied under the ever increasing number of indications.

1. *Cesarean section for contracted pelvis.*—Routh in his comprehensive report of 1911 gives the maternal mortality of cesarean section when performed for contracted pelvis under favorable conditions as 2.9 per cent; when performed after the patient was in labor, the membranes ruptured, but no attempts at delivery had been made,—10.8 per cent; when attempts had been made to deliver by forceps, etc., or where repeated examinations had been made the mortality was 34.3 per cent. He reports 14 cases in which cesarean section with hysterectomy was performed for the potentially septic patients with no maternal mortality.

The carefully prepared report of Kerr-Holland some ten years later shows somewhat improved mortality for cesarean section in contracted pelvis. These two writers classified the cases as follows:

- a. Not in labor, maternal mortality 1.6 per cent, fetal deaths 0.8 per cent, infant mortality of survivors 3.9 per cent.
- b. Early in labor, maternal mortality 1.8 per cent, fetal deaths 1 per cent, infant mortality of survivors 5 per cent.
- c. Late in labor, maternal mortality 10 per cent, fetal deaths 5 per cent, infant mortality of survivors 5 per cent.
- d. After induction of labor, maternal mortality 14 per cent.
- e. After attempts at vaginal delivery, maternal mortality 27 per cent, fetal deaths 27 per cent, infant mortality of survivors 10.9 per cent.

This report shows a high mortality in late cesarean section not only for mother and fetus, but also lessened chance for the living infant who survives the long labor and late section.

Holland in this same report gives a maternal mortality of 17 per cent in 46 cases of cesarean section with hysterectomy.

2. *Cesarean section for fibroma complicating labor.*—In his 1911 report, Routh classifies the results of cesarean section for fibroma uteri complicating pregnancy and labor according to the following modes of treatment:

a. By cesarean section alone, 20 cases, maternal mortality 30 per cent, fetal mortality 20 per cent.

b. By cesarean section and myomeetomy, 5 cases, no maternal or fetal deaths.

c. By cesarean section and supravaginal hysterectomy with extraperitoneal disposal of stump, 7 cases, maternal mortality 14.3 per cent, fetal mortality 14.3 per cent.

d. By cesarean section and supravaginal hysterectomy with intraperitoneal disposal of cervical stump, 26 cases, maternal mortality 15.4 per cent, fetal mortality 15.4 per cent.

e. By cesarean section and panhysterectomy, 13 cases, maternal mortality 7.7 per cent, fetal mortality 37.7 per cent.

The report of Kerr-Holland mentions 88 cases with a total mortality of 10 per cent and fetal mortality of 12.5 per cent.

The 88 cases were treated as follows:

a. By cesarean section alone, 23 cases, maternal mortality 9 per cent.

b. By cesarean section and myomeetomy, 23 cases, maternal mortality 13 per cent.

c. By cesarean section hysterectomy, 42 cases maternal mortality 9 per cent.

3. *Cesarean section for antepartum hemorrhage.*—Routh quotes a comparatively small group of cases in which cesarean section was performed for antepartum hemorrhages.

a. For concealed accidental hemorrhages, 4 cases, maternal mortality 50 per cent.

b. For placenta previa, seven cases, maternal mortality 14 per cent, fetal mortality 57 per cent.

Kerr and Holland report a much larger series in which cesarean section was performed for antepartum hemorrhage.

a. For placenta previa, 139 cases, maternal mortality 11.5 per cent, fetal mortality 7 per cent, infant mortality of surviving infants 22.3 per cent. (Holland remarks on the high percentage of infant deaths among those who survive the immediate effects of the operation.)

b. For accidental hemorrhage, 66 cases, maternal mortality 27 per cent, fetal mortality 86 per cent.

Of these 66 cases of accidental hemorrhage, 36 were treated by simple cesarean section with a maternal mortality of 11 per cent, while 30 were treated by cesarean section hysterectomy with a maternal mortality of 46.6 per cent.

Bourne in *Recent Advances in Obstetrics and Gynecology* reports 34 cases of central or marginal placenta previa treated by cesarean section at Queen Charlotte's Hospital during a four year period, the maternal mortality 5.9 per cent and the fetal mortality 34.4 per cent. Bourne's patients were rather carefully selected, consisting of the cases of complete placenta previa in which the cervix was only slightly dilated and not easily dilatable. His results are considerably better than those gathered together for the whole British Empire by Holland and Kerr.

4. *Cesarean section for eclampsia.*—Evidence against applying cesarean section to cases of eclampsia is presented in the accumulated reports of both Routh and Holland.

Routh reports 10 cases with a maternal mortality of 60 per cent.

Holland reports 195 cases, maternal mortality 31.8 per cent, fetal mortality 32 per cent, infant mortality of fetal survivors 26 per cent.

Peterson in a critical review of 500 published and unpublished cases of abdominal cesarean section for eclampsia gives a total maternal mortality 34.8 per cent and a fetal mortality of 12 per cent.

The statistical report of the Chicago Lying-In Hospital and Dispensary shows that in this institution from 1918 to 1925, cesarean section was performed 12 times for eclampsia with no deaths in mother or child.

#### STATISTICS OF CESAREAN SECTION IN THE OBSTETRICAL DEPARTMENT OF THE JEFFERSON HOSPITAL

I have left until the last the less pleasant task of auditing the report of cesarean sections performed in the wards of the Jefferson Medical College Hospital on patients admitted from September, 1925, to September, 1926. I say "less pleasant task" because there are several case results of which we are not proud as a department. These, nevertheless, have been a lesson to us, and if they may be of help to others, we can see no reason why they should not be published.

During the period stated there have been 25 cesarean sections performed by various operators, all of the classical type, under ether anesthesia. There have been four maternal deaths,—16 per cent.

The causes of maternal deaths and associated circumstances were as follows:

1. The first case died from sepsis. The patient was primigravida with a living baby in transverse position. The patient had been in labor 24 hours, the membranes ruptured, the cervix tightly contracted around a prolapsed extremity, the uterus tetanically contracted around the body of the child.

2. The second death was from peritonitis. The patient was a multigravida with partial placenta previa. The heart sounds of the fetus were audible at the time of preparation for operation. The cervix was dilated two fingers, not a great deal of blood had been lost.

3. The third patient was admitted to the ward moribund from violent hemorrhage of placenta previa. The operator felt that no procedure offered a substantial hope of saving the mother and chose cesarean section as giving the best chance for the fetus. In the latter he was successful. The mother died on the operating table.

4. The last death was from sepsis. The patient was a primigravida with myoma uteri complicating pregnancy and labor. She was allowed to go into labor with the belief that the position of the myoma would not obstruct delivery. The head failed to engage in the pelvis. A late cesarean section and myomectomy were performed.

Twenty-six infants were delivered; of these, three were born dead (11.9 per cent) and three died after delivery (11.9 per cent), a total



mortality of 23.8 per cent. The three stillbirths occurred in cases of antepartum bleeding; one in placenta previa, the other two in premature separation of the placenta. Of the three infants who died after delivery one was premature (8½ months) in a case of placenta previa, the second was luetie, and the third not viable.

Excluding the patients upon whom cesarean sections were performed for antepartum bleeding, there were nine patients upon whom section was performed for various indications, as an elective operation or early in labor. Among these nine patients there were no maternal deaths; there was one fetal death because of nonviability, and one luetie child died before leaving the hospital.

There were nine patients upon whom cesarean section was performed after ten hours of labor. In this group there were two maternal deaths, 22.2 per cent. There were no fetal deaths in this group.

Cesarean section and myomectomy were performed on two patients for fibroma uteri complicating labor with one maternal death.

Five patients with placenta previa were treated by cesarean section with two maternal deaths and two fetal deaths. One of the mothers who survived the operation is in the hospital now gradually recuperating from a puerperium complicated by pelvic inflammation, bronchitis, and pyelitis.

Two patients with complete separation of placenta and closed cervix were treated by abdominal operation; one by simple cesarean section, the other by cesarean section and hysterectomy. Both mothers made an uncomplicated recovery. The two fetuses were born dead.

In no case was cesarean section performed for eclampsia.

#### CONCLUSIONS

The study of these statistics and the results of our rather bitter experience of the past year lead unswervingly to certain conclusions.

1. Early or elective cesarean section has a low mortality, 2 to 3 per cent. Late cesarean section of the classical type has a high mortality, 20 to 30 per cent.

2. Delayed operation in cases of disproportion is dangerous. A more earnest effort must be made to reach a decision for or against cesarean section either early in labor or before its onset.

3. These statistics raise the question whether in late operation for any indication the classical cesarean section alone meets the need of the case.

4. The operative results in fibroma uteri complicating labor are not particularly good. There are problems in the conduct of labor of these cases which are open to discussion.

5. In placenta previa the collected maternal mortality is higher for cesarean section than for the other commonly accepted methods of

delivery. The operation appears best in the case of central placenta previa with a nondilated resistant cervix. In such a patient the maternal mortality is as good or better than that of other methods of delivery and the fetal mortality considerably less.

6. The question of applying cesarean section in certain cases of premature separation of the placenta is still under consideration. From our experience we feel that it is the best method where most of the bleeding is concealed and the cervix not dilated, provided the condition of the patient warrants interference.

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## PREGNANCY AND HEART DISEASE

### A STATISTICAL REPORT AND SUMMARY OF 196 CASES

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SINCE October, 1919, pregnant women with cardiac disease in care of the Sloane Hospital for Women have been assigned to a special cardiac clinic under medical as well as obstetric supervision.

Cardiac cases are detected as early in pregnancy as possible and report at fortnightly intervals in order that any showing decompensation may have early study. In general when signs of circulatory embarrassment appear, these patients are placed in the hospital and treated as medical rather than obstetric cases. It is our experience that the response to medical treatment of the pregnant woman with heart disease and circulatory stasis is satisfactory; often quite as satisfactory as in like conditions in the nonpregnant. Rest, sedatives, massage, restriction of salt and fluid, digitalis, diuretics, hydrogogue cathartics,—these are the means at command for the effective control of circulatory breakdown in pregnancy as in other states. It is quite unnecessary to reiterate the details of management. A patient whose

circulatory balance has been restored again becomes an ambulant member of the clientele of the cardiac clinic, to be hospitalized, perhaps repeatedly, whenever dyspnea, cyanosis, tachycardia, edema, pulmonary or hepatic stasis occur.

In this way the average pregnant cardiac can be carried along to viability or term. If circulatory breakdown occurs before the fourth month, abortion is usually wise; if not until later, it is usually possible to carry on with safety until term or until lack of suitable response to medical treatment indicates a condition so serious that pregnancy must be ended.

In our seven years of work with the pregnant cardiac, we have become impressed by certain points that merit special mention.

1. Diagnosis. The difficulties of diagnosis of cardiac lesions are increased by pregnancy. The raised diaphragm, the rotation of the heart upward and to the left, the enlargement of the breast, the more rapid pulse rate are factors in making the diagnosis of cardiac lesions uncertain. The observer must more than ever be alert to the separation of the real from the spurious. The signs of mitral stenosis are particularly variable in pregnancy and are most often missed or misinterpreted. Again and again they are present on one examination, absent at another.

2. Extrasystolic irregularities are frequent during the later months of pregnancy, are rarely of serious purport and appear to have the same significance as in the nonpregnant.

3. Nature safeguards the mother and child by accelerating delivery of a somewhat premature and therefore undersized infant. The edema of the maternal soft parts facilitates labor. Cardiac cases, therefore, have as a rule easy labors.

4. While mitral stenosis is traditionally the most serious heart lesion complicating obstetrics, aortic insufficiency seems to be actually attended by the greatest maternal risk. Syphilitic aortitis or myocarditis does not seem to make the immediate maternal prognosis bad. Such cases go through labor very well. Fibrillation is not incompatible with successful reproduction if the myocardial capacity is not unduly impaired.

5. No attempt should be made to induce labor in a badly decompensated patient. Patient trial must always be made of medical measures. A good medical equation is the following: cardiac decompensation  $\div$  forcible delivery = death. In the case in which compensation cannot be restored with thorough medical treatment, a grave situation is present. Without delivery, the patient may die; with forcible delivery, she will almost surely perish. In this medical impasse, it is usually best to trust nature more and art less. In general, if a patient cannot restore her circulatory balance before delivery, she is not very

sure of doing so after labor. It is better to let such cases deliver themselves which they often do with surprising ease. Probably 50 per cent of women in this situation will die, but the medical attendant must realize that the life expectancy of such serious cases is at best short and may be cut down but little by the pregnancy and delivery.

6. Delivery should be in the most expert obstetric hands with the object the making the second stage short and easy. Usually a full anesthesia with ether, which the cardiac case tolerates well, and low forceps effect a satisfactory delivery. When obstetric obstacles are present, cesarean section in proper hands with general or spinal anesthesia may be advisable. This gives the advantage of allowing resection of the fallopian tubes in the numerous cases in which sterilization is desirable.

7. Liability to embolism, so frequent in younger women with mitral stenosis, seems not to be increased by pregnancy and labor.

8. If serious circulatory breakdown is avoided in the antenatal and natal periods, there is usually little or no postnatal diminution in the reserve power of the heart as a result of the experience. If decompensation has occurred, future circulatory capacity is definitely lessened.

The following is a statistical summary and tabulation of 196 cases of organic cardiac disease delivered in the Sloane Hospital from October, 1921, to April, 1926. One of us (W. W. H.) summarized 40 cases delivered in the same hospital from October, 1919, to October, 1921. This makes a total of 236 cases studied.

Points of interest brought out by these statistics are as follows:

*Mortality.*—In 103 cases followed in the cardiac clinic this was 5.8 per cent, in 93 others, 6.4 per cent. In view of the fact that many of the second group were emergency admissions, the difference in mortality in those with and without antenatal care is not striking.

*Toxemia.*—The increased incidence of so-called toxemia of pregnancy in examples of cardiac disease was noted in the earlier report. Hypertension, albuminuria, edema and other so-called toxic symptoms were seen in 19.4 per cent of the cardiac cases, while the incidence of these in noncardiac pregnant cases was six per cent. Miscellaneous complications, particularly the infections, seem not to be of increased frequency in these examples of heart disease and pregnancy.

*Labor.*—The relatively short duration of the second stage (one hour, thirty minutes), the small average weight of the child (6 pounds, 8 ounces), and the high incidence of prematurity (16.3 per cent), are worthy of comment.

*Follow-Up.*—One hundred and nine cases were followed up from two months to two years postpartum, the average being about one year. Of these seven were dead at the end of three months postpartum. This may not be higher than the expected mortality in any group of

chronic cardiac cases without the complicating circumstances of pregnancy. Of the 109 cases, 72 or 66 per cent were free from cardiac symptoms when observed at the follow-up clinic; 38 or 35 per cent complained of cardiac symptoms. These statistics bear out an opinion gained from seven years' experience that pregnancy and childbearing when properly supervised and safeguarded is not a great menace to the safety or life of the average ambulant case of heart disease.

### STATISTICAL REPORT OF SLOANE HOSPITAL CARDIAC CASES OCTOBER, 1921, TO APRIL, 1926

1. Total number of cardiac cases-----	196
Cases followed in cardiac clinic-----	103
Private patients -----	23
Emergency admissions -----	23
Hospitalized antepartum (once) -----	75
Hospitalized antepartum (twice) -----	15
Hospitalized antepartum (four times) -----	2
Maternal mortality -----	12
(Of these, 6 were emergency admissions, 6 were clinic cases)	
Stillbirths after period of viability-----	24
A. Of the 196 cases there were:	
Gravida 1, ----- 52	Gravida 8, ----- 1
Gravida 2, ----- 48	Gravida 9, ----- 5
Gravida 3, ----- 28	Gravida 10, ----- 1
Gravida 4, ----- 24	Gravida 11, ----- 1
Gravida 5, ----- 13	Gravida 12, ----- 3
Gravida 6, ----- 6	Gravida 15, ----- 1
Gravida 7, ----- 13	Gravida 17, ----- 1
Cases having more than one delivery at Sloane during this period:	
2 deliveries -----	31
3 deliveries -----	5
4 deliveries -----	1
2. Mothers' age (average)-----	30 years
(Youngest 16 years, oldest 45 years.)	
3. Race:	
( 1) Negro -----	40
( 2) Irish and Irish-Am.-----	37
( 3) American (Am. born of Am. parentage) -----	32
( 4) German-Austrian (Teutonic peoples) -----	16
( 5) British (Irish excepted) -----	12
( 6) Russian and Pole -----	12
( 7) Italians -----	11
( 8) Hebrews -----	5
( 9) Spanish, Mexican, Porto Rican (white).-----	5
(10) Belgian, French, Swiss -----	4
(11) Scandinavian -----	4
(12) Greek -----	2
(13) Assyrian and Japanese -----	1 each
(14) Several others no race mentioned	

## 4. Lesions:

## A. Chronic cardiac valvular disease. (Accompanied in almost every case by cardiac hypertrophy)

Mitral insufficiency .....	63
Mitral insufficiency and stenosis .....	78
Mitral insufficiency, and stenosis, aortic insufficiency.....	29
Aortic insufficiency .....	1
Aortic insufficiency, and stenosis .....	1

## B. Cardiac hypertrophy (no valvular lesion)..... 14

## C. Acute cardiac dilatation (with or without other cardiac conditions) 11

## D. Arrhythmias ..... 7

Fibrillation

Premature contractions

Heart-block, partial.

## E. Subacute bacterial endocarditis ..... 2

## F. Unclassified ..... 2

## 5. Antecedent Infections:

## A. Rheumatic disease.

(1) Rheumatic fever .....	40
(2) Rheumatic fever and chorea.....	5
(3) Rheumatic fever and tonsillitis .....	11
(4) Rheumatic fever and influenza .....	11
(5) Chorea .....	6
(6) Chorea and influenza.....	2
(7) Tonsillitis .....	23
(8) Tonsillitis and influenza.....	5

## B. Syphilis ..... 18

## C. Other Infections (no history of rheumatism or syphilis).

(1) Influenza .....	10
(2) Diphtheria .....	6
(3) Scarlet .....	8
(4) Typhoid .....	2
(5) Oral sepsis (no other focus infection) .....	1

## D. No history of antecedent infections, (several of this group were emergency admissions, and no past history was obtained)---- 53

## 6. Time at which cardiac symptoms were first noticed:

Before pregnancy .....	90
During pregnancy .....	83
(a) 1st Trimester .....	45
(b) 2nd Trimester .....	70
(c) 3rd Trimester .....	42
Postpartum .....	3
No symptoms at any time.....	13
Symptoms not recorded .....	7

7. Decompensated cases ..... 47  
(23 of these cases were emergency admissions)

## 8. Complications:

Toxemias without convulsions 37*	Pyelitis -----	3
Toxemias with convulsions-- 1	Chorea -----	1
Hypertension----- *	Ventral hernia (requiring	
Goiter (nontoxic)----- 7	operation) -----	1
Goiter (toxic)----- 5	Dermoid cyst of ovary (re-	
Furunculosis ----- 4	quiring operation) -----	1
Infarcts of lungs----- 5	Furunculosis -----	1
Thrombophlebitis----- 3	Subacute endometritis (puer-	
Cerebral hemorrhage----- 1	perium) -----	1
Pneumonia (antepartum)--- 3	Multiple neuritis -----	1
Pneumonia (postpartum)--- 2	Subacute Streptococcus endo-	
Acute bronchitis ----- 2	carditis -----	1
Grippe ----- 1	Subacute Staphylococcus ----	1
Tonsillitis----- 1	Acquired hemolytic jaundice--	1
Acidosis----- 1	Catarrhal jaundice -----	1

## 9. Labor and delivery:

Average duration, first stage-----	11 hr. 36 min.
Average duration, second stage-----	1 hr. 20 min.
Forceps, low -----	34 cases
Forceps, medium -----	11 cases
Forceps, high -----	6 cases
Average weight of baby-----	6 lb. 8 oz.
Number of premature babies-----	32
Cesarean section -----	8
Cesarean section with sterilization-----	7
Therapeutic abortion -----	9
Therapeutic abortion and sterilization-----	11

## 10. Economic Status:†

Good -----	65
Fair -----	43
Poor -----	60

## FOLLOW-UP

	SYMPTOM FREE	SYMPTOMS	MORTALITY AFTER DISCHARGE
2 to 3 mo.	25	16	1 - (3 mo.)
4 to 6 mo.	11	11	0
1 year	29	9	1 - (11 mo.)
Later	7	2	1 - (13 mo.)
			2 - (15 mo.)
			1 - (22 mo.)
			1 - (30 mo.)
		Total 7	
No cardiac follow-up -----			68
(Private patients not included.)			

\*Included in above.

†Based on home and financial conditions as investigated by Social Service Department.

# REPORT OF A CASE OF SEPARATION OF THE SYMPHYSIS PUBIS AND FRACTURE OF THE ASCENDING RAMUS WITH NORMAL DELIVERY\*

BY JACOB WALKER, M.D., PHILADELPHIA, PA.

(From Department of Obstetrics, Jefferson Medical College)

IN THE American literature on the above subject, I found only a few instances in which both a rupture or separation of the pubic joint was associated with a fracture of the pelvis, especially in a normal delivery.

DeLeo states that rupture of the pelvic joints during labor, while rare, is not so uncommon as is generally believed and he has recorded sixteen such cases, the majority involving the pubic joint, and sometimes the sacroiliac joints, either alone or with the former.

Stimson states that separation of the symphysis pubis can take place during the descent of the fetus through the superior strait in parturition. He quotes Maligne who collected seventeen cases of the latter, most of them occurring in primiparae.

In the New York Lying-In Hospital there occurred two cases of separation of pubic joint in 87,000 labors, this condition being rather rare in this institution.

Ahlfeld and Schauta collected 114 cases, and Hirst reports that in 94,149 labors this accident occurred three times.

Bird in 1902 reports a recovery after a fracture of the horizontal ramus of the pubis *before* the application of forceps.

Jolly reports three cases, two of which were discovered at autopsy.

Morgan in 1916 reports four cases in his experience, with no deaths. Schaeffer reports one case in a para x produced by the delivery of unusually large shoulders, the diastasis being three cm. in width; an abscess formed in the joint.

Strassman reports one case with five cm. separation that was discovered at autopsy; the patient died of hemorrhage.

Delestre reports one spontaneous rupture upon the third day postpartum, in a patient nineteen years of age, which became infected and the patient died.

Radaux in 1898 collected notes on 98 cases, and claimed that 25 of these were spontaneous. Up until about 1903 there were 130 recorded cases and according to these figures the accident occurs about once in 25,000 cases. This does not include cases of excessive relaxation of the pelvic joints.

## CASE REPORT

The case that I am reporting is a primipara, age 31, housewife. Her past medical history had no bearing on the present condition, there had not been any rickets, osteomalacia, or chronic rheumatism. Menstruation was a normal twenty-eight day type and lasting four to five days; was not associated with pain. No history of miscarriages; urine was negative; Wassermann was negative.

Four days before the expected time of delivery, the patient was admitted to the hospital apparently in labor, complaining of pains in the lower abdomen and

\*Read at a meeting of the Philadelphia Obstetrical Society, October 7, 1926.



drawing pains in the legs. After being properly prepared, abdominal examination revealed the uterus enlarged to a full time pregnancy, the back to the left, a vertex presentation with the fetal heart in the left lower quadrant. The presenting part was engaged in the pelvis, there being a favorable proportion between the head and the pelvis. No definite uterine contractions could be felt. On vaginal examination there was no dilatation of the cervix. She had a slight rise in temperature, and complained of severe pains radiating down the leg, and had much difficulty on turning from side to side.

After a dose of castor oil, ounces  $1\frac{1}{2}$ , and quinine bisulphate, grains 15, the patient failed to fall into active labor. In the meantime, two days after admission, she developed a marked chill followed by a rise of temperature to  $104^{\circ}$  F., which dropped to normal the following day. At this time there was a slight brownish red vaginal discharge, the pains in the legs became worse and she was unable to raise them unless assisted. Examining the patient externally again, I found a marked point of tenderness over the pubic joint and also a marked separation of the same.

In questioning the patient as to the possibility of an injury, it was difficult to elicit any history of direct violence but ultimately I obtained a history of stumbling over a bucket of water two days before entering the hospital. Shortly after this occurred she began to have some pain which she thought were labor pains but did not at the time of the accident think anything of it, and failed to mention the same as a possible cause of her ailment.

On the fourth day after admission she began to have regular uterine contractions, not severe, and was then definitely in labor. She continued in labor lying prone on her back and was unable to turn from side to side. The first stage of labor lasted twenty-eight hours and the membranes ruptured. She was conveyed to the delivery room and about twenty minutes before the birth of the child, her limbs were placed in stirrups and, apparently without an unusual amount of pain or complaint she was delivered normally of a baby weighing  $6\frac{1}{4}$  pounds. Ten minutes later the placenta was expelled normally. In view of facts that were later ascertained, it certainly seemed remarkable that we were able to separate the patient's limbs and to put her legs in stirrups and that she complained very little of pain.

The puerperium was attended with an irregular fever never going above  $100.4^{\circ}$  F. for the first seven days. She was unable to turn from side to side, complaining of severe pain in the lower abdomen and over the pubic bone, the pain being so intense that we had to resort to sedatives. On the tenth day the temperature began to rise from  $101^{\circ}$  to  $103^{\circ}$ , and then an internal examination was made. Marked tenderness over the ascending ramus of the pubic joint was found. A roentgen ray examination was deemed imperative, but having no appliances at this hospital, it was decided to move the patient to a general hospital on the twentieth day after delivery. In the meantime the patient was running an irregular fever and we felt quite certain that it was not due to a puerperal infection. Curiously it was noted that after the first day of admittance to the general hospital, her temperature dropped to normal and stayed normal for the remainder of her illness.

The roentgen examination showed a transverse line of fracture at the junction of the ascending ramus of the ischium with the pubis, without any apparent displacement. There was no evidence of any disease of innominate bones, sacrum, or either hip joint. A supplementary report read, "marked rarefaction and partial absorption of symphysis pubis. The outline is rather irregular and there is a suspicion of a fracture which may be due to a pathologic condition." A subsequent report, three months after her admission to the first hospital, showed that there was still evidence of a fracture in good position, although the symphysis pubis still showed separation of half an inch. There was some rarefaction of the bone around the fracture.

The treatment consisted of an application of a plaster of Paris cast to the pelvis and rest in bed. The pelvic cast was removed one month after its application and an adhesive girdle applied. Ten days later the patient was permitted to walk about and was discharged from the hospital ten weeks after admittance.

I have observed in three or four other instances the separation of the pubic joints not nearly as marked nor as serious as the case reported. In those instances the condition was noted immediately after delivery, particularly in cases where the patient's limbs were placed in stirrups on a rather wide delivery table. These patients complained of intense pain right over the pubic joint, which lasted about four days, associated with marked difficulty in turning from side to side and in raising the limbs. Relief was usually given by the use of a tight binder over the pelvic girdle and a hot water bag over the pubic joint. The condition is often brought about by an attendant or nurse forcibly separating the patient's limbs while she is resisting the effort of having her limbs placed in stirrups, while under light anesthesia. This condition is overcome by the use of proper leg holders which permit of adjustment to the individual case and also by having the nurses support the limbs instead of the use of stirrups. I recall seeing a patient recently who thought she was in labor and upon examination there were no uterine contractions nor any cervical dilatation. The pain was finally located over the pubic joint. Pressure over this area elicited marked tenderness. The etiologic factor in this instance was a misstep in descending a stairway.

In reviewing the separation of pelvic joints and fracture of pelvic bones during labor, we must include not only the pubic joint but also the sacroiliac and sacrococcygeal. DeLee states that in order for a rupture to take place an enormous amount of force is necessary, from 400 to 2600 pounds, to disrupt the pelvic girdle and if it is not due to this force, there must be some inherent weakness and an underlying pathologic condition which caused the separation of the joints and also the pathologic fracture. Caries, rickets, osteomalacia, trauma during pregnancy, congenital weakness of the ligaments, contracted pelvis, especially the justominor and funnel varieties also predispose, likewise a large child and especially broad shoulders. Sixty-seven per cent are caused by forceps delivery, improperly directed forceps traction, by pulling upward too soon, or by pulling upward with a patient on a low bed, the head acting as a wedge between the rami, or using too great force even in the absence of pathologic softening.

Very rarely during the violent efforts at traction necessitated by instrumental delivery in badly contracted pelvis, some portion of the innominate bones may be fractured. It is never pardonable, for in such pelvic deformity instrumental deliveries are contraindicated, some other major obstetric operation being the proper procedure. It

is possible for a pelvic bone rendered brittle by rickets or any other abnormal process, without having undergone marked alterations and shape, to yield during a properly conducted instrumental delivery, but such an occurrence is exceedingly rare.

The symptoms, as DeLee states them, are that the patient complains of pain in the pubis and sacroiliac joints with great difficulty in locomotion for several weeks. During spontaneous labor, the rupture may be discovered at the moment it occurred, being heard as a dull cracking, or the patient says something has burst. Usually the operator feels and hears the joint open during the delivery and notes the obstruction to the progress of the child has suddenly disappeared. Usually a gap can be felt with a finger and this is the chief diagnostic symptom. The separation is believed to take place not through the cartilage but between the cartilage and the bone. Later the patient complains of intense pain over the affected joints, radiating down the thighs, and cannot move the legs, which lie everted and abducted. It is a sort of pseudoparalysis and has been often mistaken for an acute paraplegia, due to the injury of the nerve in the pelvis or acute infectious myelitis. There are no bladder or rectal symptoms unless the viscera are injured at the same time. Chills and fever betoken the advent of infection in the joint.

The diagnosis is easily made if the condition is considered, the main points being a history of a difficult delivery, the position of the patient in bed, pain and tenderness over the pubic joint, palpation of a groove over the joint with movability of the pubic bones on each other.

One must differentiate the condition from paraplegia by the fact that the reflex is normal, that the individual muscle groups are functioning and there is normal sensation. Later, after fever has developed, one must differentiate the condition from (1) acute sepsis, (2) pelvic inflammation and pressure on nerves by pelvic exudates, (3) acute toxic neuritis, (4) myelitis, (5) cystitis, (6) hysteria.

Suppuration may develop in these joints. DeLee also states that even if the diagnosis be made early this accident is dangerous although often recovery and later restoration of function occur, the latter requiring from three to eight weeks. Injuries to the adjacent viscera, primary hemorrhage, shock, and later sepsis bring the mortality of reported cases to 35 per cent. If infection of the joint occurs it is serious because the abscesses burrow far and wide.

The reports of cases show that most instances of pubic joint rupture were not associated with a fracture of the pelvis and the case I have reported was interesting from the fact that a fracture and a separation of pubic joint occurred without forceps operation, but in a normal delivery.

*(For discussion see page 658.)*

# PERINEAL INJURIES DURING PARTURITION, WITH A REPORT OF 336 CASES\*

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*(From the Department of Obstetrics of the Jefferson Medical College)*

**D**URING pregnancy and labor both mother and child are exposed to certain hazards, many of which may be avoided or partly overcome by simple means or by timely operative procedures. It is only just to say that every woman has a right to hope for complete physical restoration after delivery and not to be handicapped by an uncorrected pelvic injury.

The soft structures of the pelvis of a patient confined for the first time are exposed to almost certain damage, even in normal or spontaneous delivery, but this is more likely in cases in which the attitude of the obstetrician is either one of passive, ineffective, or active meddling interference.

The anatomy of the lower birth canal is very complex, its injuries numerous, and the methods of repair diversified. Looney,<sup>1</sup> in his comprehensive paper on the anatomy of the female pelvic floor, for descriptive purposes, divided the diamond-shaped pelvic outlet by a transverse line passing between the ischial tuberosities. This line is found to pass directly over the central point of the perineum, which is midway between the posterior commissure of the vulva and the anal orifice. The triangle anterior to this dividing line is termed the urogenital triangle, because the external urinary meatus and the external genitals are found in this space, while the triangle posterior to this line is known as the anal triangle.

The urogenital triangle is covered with a thick fascial layer which includes Colles' fascia covering the superficial perineal muscles. Lying in the midline, and practically surrounding the vaginal orifice, is the bulbospongiosus muscle. Arising posteriorly from the central point of the perineum, where fibers are given off to the superficial transverse perineal muscles, and to the external sphincter of the anus, it passes anterior to either side of the vagina to be inserted into the sides and dorsal surface of the clitoris.

The superficial transverse perineal muscles are very thin strands of muscle fibers and of minor surgical importance.

Surrounding the anal orifice, and taking some of its fibers from the levator ani muscle, is the external sphincter muscle of the anus. This muscle has two attachments, the tip of the coccyx posteriorly and a

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\*Read before a meeting of the Obstetrical Society of Philadelphia, October 7, 1926.

blending with the other perineal muscles in the central part of the perineum anteriorly.

The perineal body, situated just anterior to the anus and posterior to the fourchette, is a most important obstetric and gynecologic part of the female pelvic anatomy. It is the point of insertion of all of the superficial perineal muscles, and some of the deeper muscles of the pelvis as well. The fascial layers blend at this point, and make it of musculofibrous consistency. It extends upwards as a wedge between the lower parts of the vagina and the rectum, where the latter turns backwards as the anal canal. It is about one and a quarter inches long from its base at the skin to its apex, the site where the walls of the vagina and rectum come in contact.

Situated beneath the superficial perineal muscles is the urogenital diaphragm, enclosing, between its two fascial layers, the sphincter muscle of the membranous urethra, anteriorly, and the deep transverse perineal muscles, posteriorly. Above this structure is found the pelvic diaphragm, composed of the levator ani and coccygeal muscles, covered with their superior and inferior layers of fascia.

The origin and insertion of the two levator ani muscles are very complex. Their chief function is the support of the viscera of the pelvis minor. In front and below, they separate to allow the passage of the urethra, vagina, and anal canal. Each muscle has three points of origin: the anterior fibers from the posterior pubic surface, the posterior fibers from the spines of the ischium, and the large intermediate portions from the angle between the visceral and parietal layers of the pelvic fascia. The anterior fibers pass downward along the sides of the vagina and are inserted in the central point of the perineum and the anal canal, between the sphincter muscles. They also pass behind the anal canal and lower part of the rectum. Contraction of these fibers, it will be seen, will draw the anus, rectum and vagina forward. The intermediate fibers pass posteriorly to the lower end of the rectum, where they fuse with the fibers from the opposite side and are inserted into the rectum between the sphincters. The posterior fibers pass backward and are inserted behind the rectum and to the sides of the coccyx.

It is observed that all of these structures are so intimately related, there being a blending of fascial layers and muscle fibers at so many points, that an injury of any one group must inevitably have an ill effect on the entire system.

It is almost impossible for a normal fetal part to dilate these musculofibrous structures evenly, and be expelled through them without inflicting a varying degree of damage, either open or concealed.

A careful study of the pelvic anatomy reveals a construction of dual musculature; each muscle acting in opposition to its fellow, and

they, together, uniting in such a way as to form a hammock for the support of some pelvic viscera.

Presentation and advancement of large fetal structures are always in an oblique direction, and the greatest stress is brought to bear in an eccentric location; this, along with rotation, may cause an overstretching of a group of muscles to one side of the central point of the perineum.

The urogenital and rectal triangles are the most frequent sites of herniae in the human body, caused, for the most part, by damage during the second stage of labor. The proper and complete correction of these herniae, if the bladder be involved, is probably one of the most difficult operations in modern surgery. The union of all fascial and muscular layers, as is the practice in herniorrhaphy in other parts of the body, should be employed in perineal surgery.

A great many methods have been evolved for the protection of the perineum during the birth of the fetal head.

Tweedy,<sup>2</sup> of Dublin, in his practice at the Rotunda Hospital, claims to "save" the perineum by preserving flexion of the head until the occiput has passed out under the symphysis, thus allowing the suboccipitobregmatic diameter, the smallest available diameter of the fetal head, to pass through the vulvar orifice. During this procedure the patient is placed on her left side with the thighs slightly flexed and only separated sufficiently to allow the insertion of the left arm of the operator between them. The left hand maintains flexion and governs the expulsion of the head, while the perineum is dilating. Even by the employment of this precaution, 45 per cent of the primigravida, delivered at the Rotunda Hospital, require suturing.

Allen,<sup>3</sup> from his observations of the methods used in protecting the pelvic floor during and after labor, believes the modified Walcher position should be used while the head is passing over the pelvic floor, thus minimizing tension on the perineum. To utilize the advantage this position affords, the patient's buttocks are placed on the end of the table, aided by two assistants, one holding each leg with the thighs horizontal with the body, and the legs at right angles to the thighs. Adduction and abduction can thus be made at will. This, however, only aids the perineum to distend, but does not necessarily prevent it being torn.

Another method used by Potter,<sup>4</sup> of Buffalo, is the slow and careful ironing out of the entire lower birth canal. With his patient under deep chloroform anesthesia, the index finger of the left hand is introduced into the vagina, and is slowly swept downward and backward toward the perineum. Then two fingers are introduced and so on until the whole hand is within the vagina when its walls are completely distended in every direction. Fifteen to twenty minutes may be consumed in this dilating process. In addition the vagina is frequently filled with liquid soap and allowed to remain as a lubricant, which is not washed out before the passage of the fetus.

According to Olshausen, Ballandin, Schroede, Williams and others, perineal lacerations occur in from 22 per cent to 66 per cent of primiparae and in from 10 to 15 per cent of multiparae.

Factors predisposing to perineal lacerations during the second stage of labor are numerous. The more common causes cited are the following:

1. Disproportion between the presenting part and the vulval outlet.

2. Abnormality in the mechanism of labor, such as improper flexion or extension of the presenting part.

3. Sudden and rapid expulsion of the fetus, especially following the administration of pituitrin.

4. A narrow pubic arch.

5. A rigid perineum, as found in old primiparae, mechanical interference, etc.

In a perusal of recent medical literature, a wide diversity of opinion is found regarding the value of perineotomy or episiotomy, the term first applied by Michaels in 1799; American and English textbooks on obstetrics hold it in little favor.

The usual indications for this damage-saving operation are: (1) A threatened rupture of the perineum, either open or concealed; (2) rigidity of the soft parts; (3) narrowness of the external genitalia; (4) faulty presentation; (5) a very large child, and (6) an indication for haste on the part of mother or child for rapid delivery.

Three points of incision are named: the bilateral as recommended by Seanzoni, the mediolateral or Tarnier method, and the median recommended by Kastner.

Bilateral incisions are rarely used. They have the disadvantage of being two in number and of dividing the labia at a point where repair is difficult and cicatrization conspicuous.

The median and mediolateral each have advantages and disadvantages. It matters little which incision the operator elects to use, provided he be thoroughly familiar with the anatomy and immediately after delivery closes the wound as carefully as he would an abdominal incision, remembering that divided muscles, unless carefully joined will never properly function and that the strength of all anatomic structures depends on its enveloping fascia.

The vaginal mucosa and the perineal skin provide but little support to the pelvic viscera, but should be joined in such a manner as to completely seal out all secretion which may accumulate upon their cut surface. The simple introduction of two or three nonabsorbable sutures, even though they pass to the very depth of the wound, can no longer be considered good surgery; any more than such suturing of an abdominal wound could be considered proper.

The closure of an episiotomy wound is quite simple when compared with the repair of a traumatic laceration, especially if the wound was compounded and has tributary lacerations running up into the sides of the vagina. Here, irregularly torn and retracted muscles must be dealt with, and unless parallel muscle bands, which have separated widely, are isolated and brought together in their usual position, the end-result will be disappointing.

It is our practice to use the median incision if episiotomy is indi-

cated. It is most often used in primiparae and in multiparae who have previously had extensive perineal repair. If a central incision, extending down to the superficial fibers of the anal sphincters, does not afford sufficient room to deliver the child, an oblique extension of this incision to either side of the rectum may be employed. The oblique part of this incision divides the posterior fibers of the levator ani muscle on the side on which it is extended and these must be carefully sutured as soon as delivery is completed.

These wounds are sutured with No. 2 or No. 3 twenty-day chromicized catgut. Each structure is united in the reverse order from that in which it is severed; that is, the muscle at the depth of the wound and at its upper end is sutured first. All sutures are interrupted, except those in the vaginal mucosa. All dead space is obliterated. The mucous membrane and skin are sutured in such a way as to make a water-tight coaptation and an effort is made to reconstruct the hymen, fourchette, and skin perineum along strict anatomic lines.

Traumatic lacerations are repaired exactly in the same manner.

Not all serious injuries of the pelvic floor are manifested by a superficial rent in the vaginal mucosa or even the structures immediately underneath. In many cases wide damage in the form of a separation of the levator ani muscle occurs without a frank laceration of the vaginal wall. Hence, in certain cases, a judiciously selected and properly performed perineotomy may avoid serious damage to the deep and more important pelvic structures.

Deutsehman<sup>5</sup> believes the sutures should be introduced before a mediolateral incision is made and the perineum divided over the sutures if necessary. It is claimed that the exact anatomic structures and landmarks are thus preserved.

Whatever the technic may be, the perineal incision should be made for prophylactic purposes, and not as an emergency. It should be a method of choice, and not one of necessity. The incision should be under control and not allowed to be torn by the pressure of the presenting part, or by mechanical interference.

Open lacerations of the birth canal, while the usual injuries of parturition, are by no means the only injuries which may occur.

The late J. C. Hirst,<sup>6</sup> in a lengthy article, refers to injuries of the coccyx during labor, stating that these usually occur in primiparae with justo minor pelves and in whom, in all probability, the coccyx was injured in a previous accident, but who had the trouble aggravated by subsequent forceps delivery.

Riddle<sup>7</sup> of Sydney, Australia, reports a case of extensive sloughing of the soft parts, caused by prolonged birth pressure. The patient had been in labor for eight days prior to her admission to the hospital. A large caput was presenting at the vulva, which could not be pushed back. The head was perforated and crushed. With great difficulty, a large mutilated infant was delivered. The recovery of the patient was prolonged and stormy. She ran a temperature for forty-three days, at the end of which time there was found a rectovesicovaginal fistula. The bladder wall, in the region of the trigone and close to the ureteric orifices, was missing. The entire



cervix was absent. The opening in the rectum was extensive and part of the external sphincter muscle was gone. The size of the patient's pelvis was normal. The dystocia was thought to be due to over-size of the infant.

Shaw,<sup>8</sup> of Manchester, reports a case of extensive perineal hematoma during labor in a thirty-nine-year-old primigravida, associated with an albuminuria of mild degree. The effusion of blood in the perineum started with the onset of labor and independent of manipulation. In twelve hours the hematoma was so extensive that delivery by vagina was thought to be out of the question. For that reason she was delivered by section. A hematoma, the size of a tangerine orange, was found in the right broad ligament, and the effusion extended into the right side of the bladder. The patient died on the sixth day of what was thought to be a mesenteric thrombosis. Before death, the lower part of the vagina and rectum had started to slough. The hemorrhagic extravasation was attributed to toxemia.

TABLE I. LACERATIONS

	NONE	1ST DEGREE	2ND DEGREE	3RD DEGREE	ALL DEGREES	TOTAL
Primiparae	34 or 27%	43 or 35%	47 or 38%	1	91 or 73%	125
Multiparae	138 or 65%	53 or 25%	20 or 10%		73 or 35%	211
Total	172 or 51%	96 or 29%	67 or 20%	1	164 or 49%	336

In a study of 336 recent cases delivered at the Jefferson Hospital Maternity, out of which 125 were primiparae, there were 164 vaginal and perineal tears, ranging in degree from a slight mucous membrane abrasion to one severe laceration which involved the sphincter muscle and the rectum.

Of the 125 patients delivered for the first time, there were 34, or 27 per cent, who were free from lacerations; 43, or 35 per cent, who suffered first degree lacerations; 47, or 38 per cent, who suffered second degree lacerations, and it was in this group where a complete laceration occurred.

Included in this report there were 211 multiparous patients; 138, or 65 per cent, of which received no known injury to the pelvic soft structures; 53, or 25 per cent, received first degree lacerations, and 20, or 10 per cent, received second degree lacerations. There were no complete lacerations in this group.

Of the 125 primiparae, 91, or 73 per cent, received perineal lacerations of varying degrees, and of the 211 multiparae, 73, or 35 per cent, received lacerations of the perineum.

In this series there were 21 episiotomies performed, 17 on primiparae, and 4 on multiparae. All of these episiotomies are included in the above report as second degree injuries.

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## INDICATIONS AND TECHNIC OF CESAREAN SECTION\*

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*(From the Department of Obstetrics, Jefferson Medical College)*

NOT so long ago it would have been possible to discuss the indications for cesarean section in a few short paragraphs, but today the supposed indications, as laid down by some writers, make one almost believe that the indications consist in any condition which offers any excuse for the performance of the operation, or at least, some indication which is enough to soothe the conscience of the operator.

There seems to exist in the minds of the general surgeon, the poorly trained obstetrician, and the laity a thought that this is a perfectly safe and simple operation which always gives good results, a panacea for obstetric complications. This may not be true in a large city such as this, but in smaller communities, where the general surgeon is called in consultation in difficult cases, it offers to his mind the only way out. I believe you will agree with me when I say that it takes more skill to do most of the ordinary operations of obstetrics than to do a cesarean section.

It is because of the ease with which a woman can be delivered by section that it is the choice of operations in improper cases, and it is because of the operation performed on improper cases that the maternal mortality rate is so high in some communities. In fact, as Newell so aptly states in his monograph on cesarean section, "He does not wonder why so many women die but why any recover."

In making a decision to deliver by abdominal section, it must be kept in mind that one is undertaking an abdominal operation and that abdominal surgery is never without danger. Furthermore, cesarean section is a major operation, and while it may be a simple procedure for the obstetrician, it is not for the patient. If the indications for this operation as laid down by Murphy in 1862 were followed at the present time, there would be few cesarean sections done.

It is not the absolute indications for this operation which lead the obstetricians astray, but mainly because we have allowed a certain amount of elasticity to creep into our teachings. This, I believe, is perfectly justifiable in conscientious hands and results, if not in the actual saving of lives, the placing back in the home of women who are physically capable of taking care of their newborn children and not chronic invalids from mutilation with the obstetric forceps.

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\*Read at a meeting of the Obstetrical Society of Philadelphia, October 7, 1926.

This same elasticity of indications in the hands of the untrained or conscienceless individual, or more so in the hands of the general surgeon, allows needless operations to be performed, where good obstetric judgment would have terminated the labor successfully by the vaginal route.

The absolute indications for this operation are so well known to you that I shall merely mention them. It is the borderline or elective section that I believe needs emphasis. If I may quote from a standard textbook, "Cesarean section is indicated in patients in whom pelvic obstruction exists which renders delivery per vaginam, even of a dead child, either impossible or so dangerous that an abdominal delivery is attended by no greater risk for the mother than a pelvic delivery." This is admittedly the only absolute indication for the operation, and the operator who performs cesarean section for other reasons must be sure that the benefits which are to be expected from the operation for either mother or child are sufficient to warrant a certain increase in the risk to the maternal life over what is to be expected following a pelvic delivery.

Pelvic contraction is unquestionably the most frequent indication for this operation, and the operation is indicated in absolute contraction regardless of how long the patient has been in labor or the possible presence of uterine infection. In relative contraction of the pelvis, careful examination of the patient, taking into consideration the general condition, age, parity, condition of the child, presentation, position, etc., will usually decide before labor what has to be done, or a decision can usually be reached after a short test of labor.

May I call your attention to the fact that as an undersized child cannot get through a contracted pelvis, just so a large child may not get through a normal pelvis. In other words, a woman who has a moderate contraction of the pelvis and who has given birth to a small baby, may not be so fortunate in a succeeding pregnancy with an overgrown child.

The decision as to the method of delivery in these cases is one which requires careful examination and a thorough understanding of antepartum fetometry. A discussion of the many factors involved in these cases would take more time than I am allotted, but one may mention, for example, the dilatability of the cervix, character of labor, condition of the patient, ruptured membranes, and probable effect of the labor on the patient.

In speaking of contracted pelvis we usually mean contraction at the pelvic brim. Contraction at the outlet is quite common and in certain individuals where complete tears are liable, due to contraction of the outlet, section is occasionally indicated, and I might add that if these tears are repaired satisfactorily, future children should be born by abdominal section.

Since it has been recognized that cesarean section may be performed as a matter of election instead of as an operation of last resort, one indication after another has been added until now one can find authority for using this operation in almost any obstetric complication.

Among the conditions in which the operation seems justifiable are: placenta previa, premature separation of a normally situated placenta, certain types of toxemia of pregnancy, cardiac disease, tumors of the vagina, uterus, or other obstructive tumors, atresia of the birth canal, dystocia following operations for relief of retrodisplacements, some malpositions of the fetus. A discussion of these and many more mentioned in the literature would be endless.

The dictum, "once a cesarean always a cesarean," is obviously not true as we have all seen women who, having had one section previously, have given birth to other children spontaneously. The fact that this does occur, however, is not a criterion that it is safe to allow any woman who has had a previous section for a temporary indication, to attempt labor in succeeding pregnancies.

The literature on this subject is voluminous and most contradictory. Here again I believe that the personal equation enters into the decision to perform the operation. Given a woman, who has had a section for placenta previa by a competent man, with an afebrile convalescence, pregnant at term with a fairly small child and in good general condition with no evidence of toxemia, I would be tempted to allow her to go into labor, but I use the word "tempted" reservedly because why should an obstetrician add more to his burden by worrying about whether or not a previous scar is going to rupture. Although Williams' last statistics on this subject are convincing, it must be admitted that a certain percentage do rupture and the risk involved, even if diagnosed early, is, to my mind, much greater than cesarean section at the time of election.

After considering the cases where the decision to deliver by the abdominal route can be reached with a certain amount of ease, we have the borderline case where we know vaginal delivery can be effected, but the possible benefit to either or both patients seems to be enough to take the risk of performing an abdominal operation. This is the class of patient where not only a thorough understanding of the mechanism of labor is necessary, but also a thorough understanding of the individual patient.

It may be true that in years to come most babies, at least in those cases where the accoucheur can get there in time, will be delivered by section. At the present time the man who attempts to guide a woman through labor must first be a capable doctor, second, a good obstetrician, and lastly, a competent surgeon.

I do not want to create the impression that I am averse to performing this procedure so frequently because I have never failed to regret

not doing the operation on a borderline case which had to be terminated by difficult version or forceps, but I would call your attention to the fact that in the best of hands, the word "mortality" still has a place. When one looks at the excellent results of this operation in capable hands, it is not surprising to see the indications mount.

Although we have prophylactic forceps and Potter version in addition, and although it may not be fashionable, it is still quite a satisfactory thing to allow a woman to give birth to her child spontaneously. It has been our custom to caution our senior medical students, who are shortly to go forth to serve their internships in hospitals whose chiefs have been trained elsewhere than in our own school, that methods other than the ones we employ are just as successful and that they are not to observe these methods with a critical air but to judge them by the results obtained.

It is our desire to discuss briefly the various phases of this operation and to call your attention to certain methods we have found to be satisfactory in our own hands. Looking back over a large series of patients upon whom this operation has been done, from the standpoint of mortality and morbidity of both mother and child, I have set down a certain number of questions, in the answering of which I shall endeavor to discuss a few of the important factors in dealing with parturient women upon whom it is thought best to perform this operation.

1. *What Is the Preferable Time to Perform the Operation?*—It has been found by most authorities and supported by statistics, that patients operated upon at an appointed time,—a few days before the estimated date of labor or within a few hours of its onset, before the effects of labor have lowered the resistance of the patient and repeated examinations have given rise to uterine infection,—make the most satisfactory recoveries. Unfortunately, we are called upon to perform this operation not only after the patient has been in labor for a long time, but even after many examinations and, indeed, attempts at vaginal delivery have been made.

If we could impress upon the medical profession at large the necessity of careful antenatal examinations and the calling of a consultant before trouble arises, rather than being satisfied to call for help when in many cases it is too late, we should be able to save many mothers and babies.

It is our custom to operate upon the woman with an absolute contraction of the pelvis or with some condition which we know in advance will require abdominal delivery, before the onset of labor. The moderately contracted pelvis or borderline case is allowed to go into labor, no vaginal examinations being made, and if, after a short test of labor, the time given depending on the type of uterine contrac-

tions, no definite engagement of the presenting part has taken place, immediate section is performed.

How many of you, in a borderline case, after a difficult forceps or version, have not wished you had performed section before the membranes ruptured or the patient had gone so far that you thought it inadvisable to do the operation? In other words, the decision to deliver by the abdominal route should be made, if not before labor, as soon after the onset of labor as possible. I have been very much impressed by the smooth convalescence of the patient operated upon early, in contrast to the stormy convalescence of the woman who has been operated upon after long, tiring hours of labor.

2. *What Is the Preparation for Operation?*—The ordinary preparation as for any abdominal section, together with the shaving of the external genitalia, suffices for the elective section. The bowels should be emptied by enema, and we prefer to empty the bladder by catheter. In a patient who has been in labor or has been examined, we scrub the vagina carefully and paint the labia and thighs with iodine, 3.5 per cent, and the vagina and cervix with 3 per cent solution of merurochrome.

The usual hypodermic of morphine and atropine is omitted, although on several occasions it has been given and I have failed to see any untoward effect on the child. Since the advent of morphine and magnesium sulphate rectal analgesia, numerous patients have received morphine less than one hour before the birth of the child and so far no interference with resuscitation has been noted.

Iodine and alcohol are used for the skin and an ampule of ergot is given as the abdominal wall is incised.

3. *What Anesthetic Should Be Used?*—The choice of anesthetic rests with each individual case. Ether is probably the most satisfactory of the general anesthetics and we employ it almost exclusively.

I wish to mention especially local anesthesia, which unquestionably plays a part in the successful performance of this operation in certain individuals. Although I have only used local anesthesia in eight hysterotomies, it has given satisfaction, and I believe will be used more in the future. Spinal anesthesia may be used, but is not without danger.

4. *What Incision Should Be Made in the Abdominal Wall and Uterus?*—There is still some controversy as to the abdominal incision. For the high incision I can say nothing as I have never employed it. I have reoperated upon patients where it has been used, and if the supposed claim that it gives rise to fewer adhesions is true, it was not borne out in these cases.

The incision, six inches in length, the middle of which is about the umbilicus, seems to be very satisfactory. Which side of the umbilicus

this is made does not matter, if one keeps in mind the fact that a pregnant uterus at term is usually in dextrorotation and care is taken to replace it. In doing the low operation, the suprapubic incision is used. For the Beck operation, the Pfannenstiel incision is used.

In doing the straight or so-called "classical" operation, I incise the uterus from about the junction of the lower and upper segment toward the fundus, and the incision is large enough to extract the child. I believe this incision should be large enough to extract with ease, as occasionally the uterine muscle will be torn at right angles in extracting a large child through a small incision. If the uterus is to be removed, we occasionally employ the transverse incision of Fritsch.

5. *Should the Uterus Be Delivered before Incising?*—Except in cases where there seems to be possible contamination of the uterine contents, there is no advantage of eventrating the uterus. Even then it is doubtful whether it should be done. Careful packing around the uterus, and a trained assistant who will lift it out as the child is delivered, results in practically no peritoneal spill. The uterine contents are sterile; if they are not, the classical operation probably should not be done, and, admitting that large incisions heal as well as small ones, it seems better to have your operative field look like an operation rather than an autopsy.

6. *Should the Uterus Be Packed?*—During the past few years, we have passed from the period when all sections had the uterus packed, together with thorough packing of the vagina, to the point where at the present time practically no packing is used. Occasionally, when the uterus does not contract firmly or in some cases of placenta previa, the uterus may be packed to stimulate contractions, but it is never used to help dilate the cervical canal in patients who are operated upon before labor, with no dilatation.

Unquestionably drains and packing are essential in doing pelvic and obstetric surgery, but they should be used only when definitely indicated and when used to accomplish a definite purpose rather than as a so-called definite routine.

7. *How Should the Uterine Incision Be Closed?*—By far the most important step in the operation of abdominal hysterotomy is the closure of the incision in the uterus. No matter what suture material is used or how it is put in, the object is to approximate the uterine muscle as carefully as possible, keeping in mind the fact that you are repairing an organ which alternately contracts and retracts during the healing process. Since this operation became one to use on the living instead of the moribund, many kinds of suture material have been tried and used successfully. At the present time, an absorbable suture of catgut seems to meet all the necessary requirements.

As to the method of placing the sutures, at the Jefferson Hospital we use two layers of No. 2 chromic 40-day catgut, as follows: a continuous suture in the muscle close to the endometrium and one placed as a continuous suture approximating the muscle nearer the peritoneal surface. A continuous No. 1 chromic catgut in the peritoneal covering of the uterus and sometimes another continuous suture is placed with the object of covering over the peritoneal surface of the incision.

For some time we have used, at the Philadelphia Lying-In Hospital, hemostatic or mattress sutures interrupted, usually three in number, which are inserted on one side at a distance of about 1.5 inches from the incision. These sutures are tied last and care is taken not to tie tightly, to avoid necrosis. Two continuous sutures of No. 2 chromic catgut enter beyond either end of the incision and a continuous catgut about the peritoneal layer. The sutures are so placed that when all of them are tied, there are no catgut knots in the wound. Either method is satisfactory, and although the placing of mattress sutures might be open to criticism, so far we are not convinced that it is not a good plan.

Doctor Vaux has reoperated ten of these patients and I have reoperated five, and in each case the union has been good, and a microscopic examination of part of the incised area, removed for that purpose, has shown no defects.

Some prefer interrupted sutures in the myometrium and I have been very much impressed by the subcuticular suture which Dr. Piper uses. However, any method which completely closes the wound in the muscle and in the overlying peritoneum, tied tightly enough to compress the muscle but not tightly enough to cause necrosis, is satisfactory.

8. *When Should Celiohysterectomy and the So-called Extraperitoneal Cervical Section Be Done?*—Ever since 1876, when Porro published his monograph on the removal of the uterus following cesarean section, it has been recognized that removal of the organ in certain cases is necessary. The original Porro operation of amputation of the uterine body, leaving the uterine stump extraperitoneally in the abdominal incision, has been superseded by supravaginal hysterectomy and recently in some clinics by the cervical operation of DeLee.

The most important indications for doing these operations are in the potentially infected patient, in patients with tumors of the uterine body, and in some cases of premature separation in which it is found that extensive disintegration of the uterine muscle, because of hemorrhage, has invoked atony of the uterine musculature.

I believe that in premature separation of the placenta, if the patient is in fairly good condition and the hemorrhage at all extensive, hysterectomy should be performed. The infected patient, upon whom it is necessary to perform an abdominal section, has always been the



unsatisfactory one, and from the days of Porro up to the present time, has been the cause of devising many ingenious operations.

The frankly infected patient is obviously not the case for the classical operation. That it is possible, however, to deliver these cases by abdominal section instead of sacrificing the child and mutilating the mother, has been amply demonstrated. Given such a case, one may choose between straight section with hysterectomy or the so-called extraperitoneal operation of DeLee.

It is not my purpose to discuss the merits of this fairly new operation, but I would take the time again to impress the advisability of early section in the borderline case instead of indecision or hope that your guardian angel will conduct the fetal head closer to the external world.

9. *When Should the Patient Be Sterilized?*—If the patient has no organic lesion there certainly is no reason for sterilization at the time of the first section. If the patient comes to the second section it is justifiable to inquire of the patient and of her husband their desires in the matter, and if they are willing to take the risk, she can continue to bear children by this method. It is very easy to adopt the stand that abstinence from intercourse is the solution of this problem, but practically, it does not work out.

In the patient who has repeated sections or has some organic disease, our duty lies beyond simply telling the patient and her husband that she should not again become pregnant, and as the operation of sterilization does not add to the risk at the time of section, it should be performed. Personally, I feel that if a woman has two living children delivered by abdominal section, there being no religious scruples against it, she should be sterilized. Even though there are cases on record of four, five, or even six sections, the risk is certainly increased, the operation more difficult to do, and the convalescence more stormy.

10. *What Is the After-Care?*—The routine as for any laparotomy usually suffices, plus the usual safeguards after a normal delivery. Our usual routine is as follows: Morphine is given as required. The patient is catheterized if necessary, glucose and bicarbonate of soda, 6 ounces, is given every four hours, by bowel; sips of warm water after the nausea ceases. If there is no nausea and distention at the end of twenty-four hours, liquids are given freely, followed by semi-soft diet, and by the second or third day, full diet. For gas, asafetida suppositories, rectal tube, or alum enemas may be given. During the stay in the hospital, the bowels are kept open by mineral oil and enemas. The baby is nursed routinely as in a normal case. The stitches are removed on the tenth day, the patient is allowed up on the twelfth day, and is usually discharged on the fifteenth day.

11. *What Are the Postoperative Complications?*—There seems to be a tendency for most cesarean section patients to have more distention than is usually seen after an ordinary abdominal operation, and it is thought by some that there is more tendency to acute dilatation of the stomach. We have observed at the time of operation that most patients, especially those who have been in labor for any length of time, have a distended stomach and large bowel. That certain alteration of metabolism occurs during most pregnancies is probably true and, as a result of this, there is somewhat of a tendency to colonic stasis and fermentation. Septic infection, septic peritonitis, pneumonia, embolism, thrombosis of the pelvic veins, and even acute appendicitis, occasionally occur. Parotitis has been observed on two occasions.

The usual treatment as in any other case for these complications should be carried out.

#### CONCLUSIONS

In looking over the facts of this much used and abused operation of today, may I draw the following conclusions:

1. That the indications for this operation have justifiably increased in recent years.

2. That the mortality rate, high in all sections of the country, has not decreased, and is probably due not so much to the fact that the patient has been operated upon by the unskilled man but because it has been an improper case for the operation.

3. That the patient operated upon before labor or shortly after the onset of labor has a much less stormy convalescence than the patient operated upon after being in labor for several hours.

4. That the borderline or elective section offers more chance for unwise decision than any of the problems presented to the obstetrician.

5. That in the performance of this operation, the strictest aseptic and antiseptic technique should be carried out.

6. That the closure of the uterine incision should be done with the utmost care.

7. That the after-treatment of these patients should be as simple as possible.

8. And finally that the man who attempts to deliver a patient by the abdominal route must keep in mind that, although he is doing one of the easiest of the obstetric procedures, he is subjecting that patient to an abdominal operation which is never without danger.

## THE ADVANTAGES OF RECTAL PALPATION DURING PREGNANCY AND LABOR\*

BY HARRY STUCKERT, M.D., PHILADELPHIA, PA.

*(From the Department of Obstetrics, Jefferson Medical College and Hospital)*

**O**FTTIMES the simple solution of a big problem is overlooked in the search for a solution more in keeping with the magnitude of the problem itself. Tonight I shall refer to puerperal sepsis as the big problem and a precautionary measure,—rectal palpation,—as the simple solution.

Although there has been great progress made in lessening the mortality rates of typhoid, diphtheria, and tuberculosis, puerperal sepsis is on the increase. It has been estimated that 40,000 cases of childbed fever occur each year in the United States, of which 8000 die. In Philadelphia alone, although the birth rate decreases, the mortality from puerperal sepsis increases. In 1924, with 41,343 living births, there were 107 deaths from puerperal sepsis, while in 1925, with 39,072 living births, the deaths from childbed fever had jumped to 118. These figures, of course, do not account for the many women who survive but who become life-long invalids on account of the pathologic processes which remain.

The simple solution, the substitution of rectal for vaginal palpation, is not by any means original. It is a precautionary measure that was adopted by both Reis and Kroenig in 1893. These men worked independently and reported their results within a few weeks of each other. It has been practiced by many obstetricians and gynecologists since that time, some of whom have developed a successful technique. I desire to urge its use by the general practitioner and its adoption in the teaching of medical students.

Let me first touch on the reasons why vaginal palpation is harmful. In the vagina, at all times, we find pathogenic microorganisms which, if conveyed to the cervix and beyond to the placental site, frequently result in infection. The Döderlein bacillus is credited with immunizing the upper part of the vaginal tract against infection. Now, when any foreign body enters the vagina, no matter how sterile that body may be, it carries the fluids, germs, etc., from the lower to the upper vaginal tract. Should any of these germs so carried be of virulent character, the risk to the patient is not avoided by any preparation of that foreign body.

Medical literature gives many statistical facts which prove the in-

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\*Read at a meeting of the Obstetrical Society of Philadelphia, October 7, 1926.

advisability of permitting any foreign body to enter the vagina during the last few weeks of pregnancy and during labor. DeLee reports two deaths from infection due to coition shortly before the onset of labor. Routh, of London, has shown the mortality higher in cesarean sections after repeated vaginal examinations or attempts to deliver with forceps. Beck observes that the morbidity is 30 per cent following cesarean sections after vaginal examinations were made, and only 12 per cent when no vaginal examinations were made. In 1914, when Findley was visiting one of the German University Clinics where every parturient patient was examined from 10 to 50 times in the course of the second stage of labor, he observed that one-third of these cases became infected, and he was convinced that a large percentage of these infections could be accounted for by the repeated vaginal examinations made by the instructors and students.

Since it is so generally admitted that these invasions of the vagina produce a great deal of trouble after the child is delivered, it behooves physicians to limit them to a minimum and to replace vaginal examinations by a safer means of obtaining information regarding the progress of the case.

Too often the obstetrician is called in to examine a woman who has not been able to deliver herself spontaneously, and finds that he is prevented from taking the necessary surgical steps to save both mother and child because numerous vaginal examinations, previously made, have rendered her liable to septic infection. Had the patient been examined rectally no infection would have been carried to the upper vaginal tract, and ordinary surgical cleanliness during the operative procedure would have been sufficient to protect her against infection. What knowledge was obtained by these repeated vaginal examinations that could not have been obtained in this safer manner?

The diagnosis of the comparative size of the fetal head, presentation and position, the condition of the membranes and the amount of effacement of the cervix all can be obtained by rectal examination. I do not wish to state that rectal palpation can entirely supplant vaginal examination, but in 90 per cent of all cases if used in conjunction with abdominal palpation it will reveal all necessary information. Vaginal examination made under aseptic conditions in the early stages of pregnancy will give the physician an opportunity to make the necessary internal measurements. If placenta previa or unusual bleeding takes place, vaginal examination will be of advantage if made in the operating room under the same aseptic conditions necessary in brain surgery. But for all other times the advantages of rectal palpation are numerous.

The first is embodied in what I have already mentioned; it prevents infection being carried from the lower to the upper portion of the birth canal, thus making possible numerous examinations without

danger to the patient. Second, the patient can be more readily examined since neither the vagina nor the glove need be surgically prepared. This fact enables the practicing physician to make his examination speedily and yet safely. Third, this method is less painful to the patient and in addition may be more acceptable to her sensibilities. Fourth, it greatly lessens the likelihood of premature rupture of the membranes during the first stage of labor. Fifth, it prevents the physician from assisting in the dilatation of the cervix, which action may produce such traumatism as to favor extensive cervical lacerations and also to liberate some quiescent infection.

The untoward effects of rectal examination are practically none. Fuerst reports that he has done rectal examinations on 18,000 patients and has never seen any injury to the rectum. Von Mikulicz-Radecki proctoscoped a large number of patients in order to determine whether or not any injury had been done to the rectal wall. Only an occasional hyperemia of the anterior rectal wall could be seen, but this was also found in a large number of cases which had never been subjected to rectal palpation.

The technic of rectal palpation is very simple. The examination is made with the index finger protected by a rubber finger cot or glove (glove preferred). Previous to the examination the patient should be instructed to empty the rectum by means of an enema. The vulva should be protected by a pad of gauze moistened with 5 per cent lysol solution. The thumb of the examiner should hold the pad in place over the vulva, and his remaining fingers should be folded in the palm of his hand. The index finger should be inserted very gently through the anus. There should be absolutely no pain connected with this type of examination. This is the method now being taught the students of Jefferson Medical College.

Kerwin, of St. Louis, has said that rectal examination, if adopted by the rank and file of the profession, is apt to bring about the long hoped for reduction in puerperal sepsis; with which statement I am most heartily in accord.

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(For discussion, see page 662.)

# THE VIABILITY OF THE CAST-OFF MENSTRUAL ENDOMETRIUM

BY ROLAND S. CRON, M.D., F.A.C.S., AND GEORGE GEY, B.S.  
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THE question of the viability of the epithelium found in the menstrual fluid has been one that has interested many obstetricians and gynecologists, especially since Sampson<sup>1</sup> suggested that autotransplants from endometrium may be the etiology of endometrioma (choc-

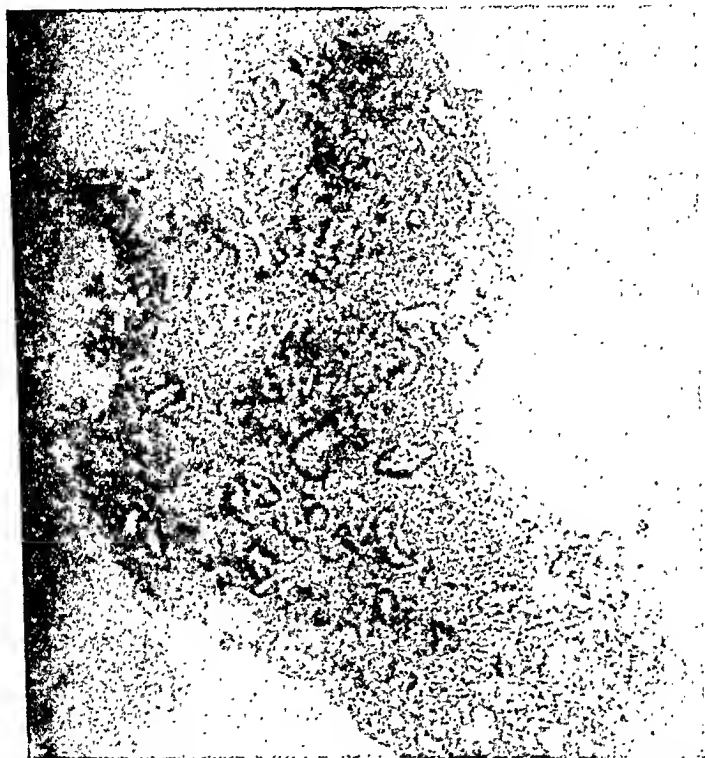


Fig. 1.—Low power photomicrograph of a tissue fragment obtained from the menstrual flow, showing healthy, and disintegrating uterine glands, and a greatly thickened and hemorrhagic mucosa (decidua menstrualis).

olate cysts of the ovary). It has been the general opinion that the endometrium of the menstruating uterus is less viable than at any other time during the menstrual cycle, and more than that, that epithelial tissue found in the menstrual flow is actually nonviable.

In order to prove or disprove this premise, epithelium from a menstruating uterus was cultured *in vitro*. The epithelium (decidua menstrualis) was obtained by gently removing with a dull curette a small amount of the menstrual flow during the second day of the

NOTE.—Since this report was submitted for publication additional experiments show that the fragments of epithelium (decidua menstrualis) normally found in the menstrual flow and obtained without the use of a dull curette, are visible. In general, as far as we have been able to determine, the decidua menstrualis is more active when cultured *in vitro* than normal endometrium.

menstruation. The specimen was obtained under the usual aseptic precautions and immediately placed in sterile normal salt solution. It was then thoroughly washed to free it of red and white blood cells. The remaining bits of tissue were then concentrated by means of the centrifuge. A part of the remaining tissue was hardened and sectioned. The pathologist's report of this is as follows: "The histologic sections consist of bits of epithelial tissue (Fig. 1) with glandular formations and a very cellular stroma containing polymorphonuclear leucocytes, red blood cells and connective tissue. The gland cells are

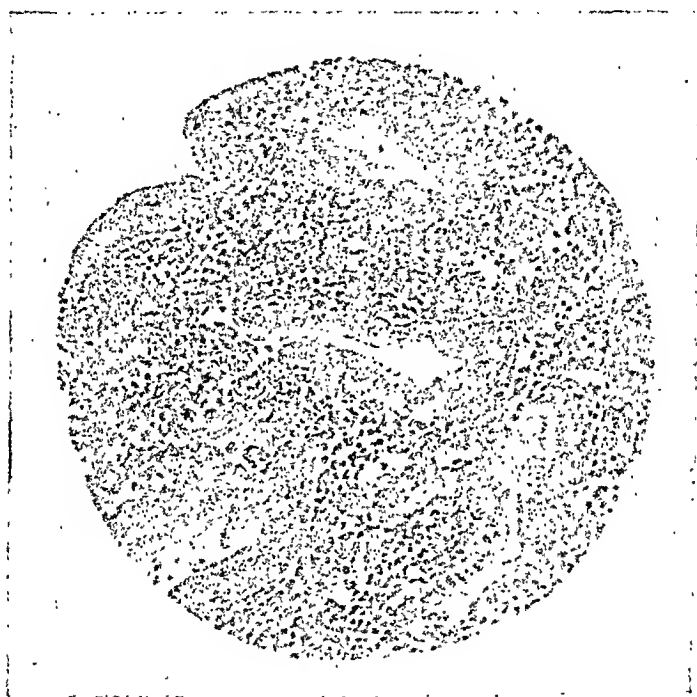


Fig. 2.—High-power photomicrograph of some of the uterine glands, showing tall hypertrophic epithelium, apparently healthy, and a richly cellular stroma.

swollen and hyperplastic (Fig. 2). Some appear to be in an active state of growth while others show some degeneration."

Tissue cultures were made of similar fragments. These were put in a plasmatic medium containing heterologous embryonic extract as the growth promoting substance. Signs of cellular activity occurred a few hours after incubation. This consisted of a very dense and massive emigration of leucocytes, which rapidly spread for several days far into the medium. The fixed tissue cells began to emigrate on the second day, when radial outgrowths of spindle-shaped cells (connective tissue) and sheet-like outgrowths of epithelial cells (Fig. 3) appeared at the periphery of the tissue fragments. The more active fragments were transferred every four or five days for over a month. Like most epithelium that has been cultured in vitro, there was a marked tendency of the tissue to liquefy the plasmatic medium. Although the fragments showed a great deal of activity at the end of a

month's cultivation, no increase in mass of the tissue occurred, and the cultures were therefore discarded. Failure to obtain an increase in the mass of the tissue was probably due to the very small size of the tissue fragments cultured, as it has been the observation of many, that a very definite cellular concentration is necessary for new tissue formation, even when the proper nutrients are supplied in the culture medium.



Fig. 3.—High-power photomicrograph of an unstained living culture of endometrial epithellum growing as an undifferentiated sheet of cells. "A" Mother-fragment, dense and opaque. "B" Border of growing sheet of epithellum.

Further experiments are under way, in which an attempt will be made to concentrate sufficient epithelial outgrowths, in order to establish a strain of endometrial epithellum. The above experiment establishes beyond any doubt that the epithellum of the decidua menstrualis, which is found in the menstrual fluid, is viable.

## A CASE OF ECLAMPSIA WITH RELATIVELY LOW BLOOD PRESSURE

By A. LINCOLN DESSER, M.D., LOS ANGELES, CALIF.

**M**RS. O. D., primipara, aged twenty-seven, was seen by me for the first time on May 14, 1926. She was married on July 3, 1924. Her last normal period was October 7, 1925, with quickening about Feb. 22, 1926, and probable date of confinement July 14.

Physical examination revealed nothing of particular significance except for a slightly enlarged thyroid which caused no symptoms. Family and past history were of no consequence, although patient believed she had scarlet fever in childhood.



Urine normal; blood pressure 120 systolic; 80 diastolic. Weight 126 pounds. On June 2, two weeks later, a second examination showed physical findings practically the same as on the previous occasion, with the exception of a slight neuralgia on the left side of the face, as the patient expressed it. Blood pressure 122/85; urine showing a slight trace of albumin; weight 134 pounds as compared with a normal of 114; some edema of face; no headache; no eye symptoms.

On the following day, June 3, shortly after noon, I was summoned to the patient's home and found her in a semicomatose condition with twitching of the muscles of the face and right arm. Blood pressure 120/80; pulse 100; temperature 98°; fetal heart 140 and of good quality. At 2:30 P.M., patient had her first convulsion and at 4:30 P.M. another, at which time her blood pressure was 170/90. She was given 20 c.c. of 10 per cent magnesium sulphate intravenously and sent to the Hollywood Hospital. A second dose of 20 c.c. magnesium sulphate was given at 6:30 P.M. Urine contained a trace of albumin and occasional hyaline cast. Blood pressure at 6:30 P.M. on the same day was 124/80; eye-grounds normal.

During the next three days, patient was delirious and showed little improvement in her toxemia but continued to have a blood pressure averaging 120/80. The blood nonprotein nitrogen was 60.00 mg. per 100 c.c. and creatinine 3.0 mg. per 100 c.c.

On June 8, the fourth day in the hospital, patient had a third convulsion with a continued low blood pressure of 120/75 and pulse 108, with fetal heart 140. Ether anesthesia was administered for the convulsion followed by 20 c.c. magnesium sulphate intravenously. At this stage, patient was in the thirty-fifth week of pregnancy. Castor oil and quinine were given to induce labor, without success. The next day heart sounds were indistinct and patient still delirious, so I deemed it an opportune time for interference. On the evening of the sixth day, under ether anesthesia, a Voorhees bag was inserted and, on the following morning, seventh day, uterine contractions were felt. Bag was expelled, membranes ruptured spontaneously, a left lateral episiotomy was done and a female stillborn infant delivered by forceps at 3:35 P.M. Blood pressure dropped to 110 over 76.

In four to five hours following the emptying of the uterus, the patient showed signs of improvement and from this time on made an uneventful recovery.

The blood pressure of the patient, with the exception of the time of the second convulsion, which then was 170/90, had averaged 120 systolic, 80 diastolic. She left the hospital on June 19 in good condition.

Asa B. Davis and James A. Harrar of the New York Lying-In Hospital, in a study of 879 cases of toxemia of pregnancy occurring during the past thirty years, make special mention of the importance of urinary findings and blood pressure readings. A trace of albumin is common enough during the latter months of pregnancy but they conclude that blood pressure elevations are much more indicative of danger ahead. A blood pressure below 140 systolic with no other symptoms should afford but little concern.

Special instructions in preeclamptic cases at the Los Angeles General Hospital are that magnesium sulphate is to be given when blood pressure registers 150 systolic or higher; also when convulsions have been controlled, if the blood pressure ascends to the height at time of previous convulsion. Yet, after several days' treatment and no rise in blood pressure, this patient developed a third convulsion, which tends to show that eclampsia may develop with a relatively low blood pressure.

# A CASE OF INTRAABDOMINAL PREGNANCY, WITH LIVING CHILD

BY WILLIAM P. DALY, M.D., HARTFORD, CONN.

**I**NTRAABDOMINAL pregnancy, of itself, is not a rarity, yet the literature is sparse in reports of cases which have gone to approximately full term, with the subsequent delivery of a living baby. The case herewith reported attaches especial interest to itself because of the early diagnosis of the existing condition, with practically no symptoms, and the variety of complications found at the time of operation.

Mrs. O. H., negress, age twenty-seven years, was admitted to the Gynecological Service of St. Francis' Hospital, August 15, 1925, with a complaint of pain in the lower midabdomen. A note accompanied her stating that she was suffering from an ovarian cyst complicating pregnancy! Her familial and domestic histories were essentially negative except in so far as her present pregnancy is concerned, which she dates back for six months, and whose existence for the past two months has been accompanied by "occasional cramps in her lower abdomen." Physical examination exhibited no gross pathology except for the abdomen which revealed a mass situated just below and to the right of the xyphoid. This upon palpation resembled a long bone of a fetus. Below the umbilicus was another mass regular in outline, which we considered to be the uterus at the size of about a five months' pregnancy. Vaginal examination confirmed our diagnosis as far as the uterus was concerned, but the superior mass seemed to bear no relation to it, and movement of the uterus was extremely painful to the patient.

A tentative diagnosis of intraabdominal pregnancy was made and x-ray ordered. The roentgenologist's report follows: "Below right twelfth rib there is apparently a long bone of fetus. As there is no other evidence from roentgen point of view of pregnancy, dermoid cyst must be considered."

Operative measures were spoken of to the patient. Fearful of these she was removed from the hospital by her husband and against the advice of the attending gynecologist.

On October 24, after all attempts at "follow-up" had failed, patient again entered the hospital about 10 P.M., this time in an eclamptic state. She was recognized and after medication had been given to control the convulsions, another x-ray was ordered. This report came back with positive evidence that a fetus was present and immediate operation was decided on. On opening the abdomen, no landmarks could be distinguished, due to the dense matting of all structures by thick exudate and adhesions. Many old clots were present and adherent to surrounding gut. Fetus free in abdominal cavity with vertex on the right side and under the liver. Living child delivered. Uterus showed small rupture present in fundus, with cord protruding through the opening. Both tubes and ovaries bound down posteriorly by a thick exudate. Because of patient's precarious condition it was deemed better to remove the uterus, tubes, and ovaries en masse. Wound was closed in layers, and three cigarette drains inserted.

Upon opening the uterus after its removal, the placenta was found in the cavity. The patient, thoroughly toxic and shocked, survived but a few hours. The child, however, is still living and apparently normal. At the time of patient's first entrance to the hospital her urine showed only a trace of albumin, with a blood pressure of 122/62. The urine on her second entrance was heavy with albumin and showed numerous hyaline and granular casts. Blood pressure 160/90. Wassermann was negative.

# Society Transactions

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## THE NEW YORK OBSTETRICAL SOCIETY

MEETING OF NOVEMBER 9, 1926

THE PRESIDENT, DR. GEORGE H. RYDER, IN THE CHAIR

DR. H. D. FURNISS reported a case of **Carbuncle of the Kidney**.

This patient, a married woman of thirty-five gave no history of any previous trouble that had any bearing upon the present condition.

On June 15, 1926, she fainted and fell on the sidewalk—at this time she was seized with chills, fever and pain in the left loin. On June 29 she was sent into the New York Infirmary for Women with a diagnosis of grippe,—she was then having severe sore throat, chills, temperature ranging from 102° to 104° F. and sweats. There was no dysuria, nocturia, or hematuria. Pharynx and tonsils injected, but no pus could be forced out. In the upper left quadrant of the abdomen was a mass extending three fingers' breadth below the costal margin, posteriorly there was slight bulging in lumbar region and obliteration of the kidney triangle. Tenderness behind but not in front. Urine, acid, showed a trace of albumin and a few white blood cells. Blood count showed 9,600 white cells 90 per cent polymorphonuclears. A diagnosis of perinephritic abscess was made.

On July 3, 1926, a left lumbar incision was made and six ounces of pus evacuated. Iodoform drainage. She drained until the end of July when a "lump" appeared in the abdomen, extending well below the left costal margin. She complained of pain radiating down the course of the ureter, and the temperature rose to 106°. The former incision was reopened but no pus evacuated. After this temperature ranged from 103° to 99°. During this time there was a leucocytosis of 13,000 to 17,000, with a polymuclear percentage of 82 to 87. Blood culture was negative. The urine from the bladder and from the left kidney showed at various times gram-negative cocci, and colon bacilli. Smears and guinea pig inoculation negative for tubercle bacilli.

Indigo carmine elimination was seven minutes from the right and ten minutes from left side on Oct. 5, 1926. Phenolsulphonephthalein test showed 60 per cent the first hour and 11 per cent the second. A pyelogram showed a distortion of the pelvis.

Dr. Furniss saw the patient on October 8. She then appeared ill on account of prolonged sepsis. There was a mass in the upper left quadrant with a sinus discharging only a small amount of pus in the lumbar region. No signs or history of any primary focus of infection, except that in the throat, could be elicited. A diagnosis of a cortical infection of the kidney was made on the history, the failure of the patient to get well after drainage of the perinephritic abscess, and upon the slight urinary abnormalities.

At operation the kidney was found to be bound down by a dense infiltration of the perirenal structures, but was removed with only slight difficulty by a subcapsular nephrectomy. Partial closure of wound and iodoform drainage.

The upper two-thirds of the kidney was replaced by dense indurated tissue filled with numerous abscesses from  $\frac{1}{4}$  to  $\frac{3}{16}$  inches in diameter, exactly similar to the

findings in a carbuncle elsewhere. The lower third of the kidney was uninvolved. *Staphylococcus aureus* was found on culture.

The patient has made a good recovery and gained weight and strength. For a few weeks there was a moderate amount of urinary leakage due to reflux through the ureter from the bladder.

*Comment.*—It is probable that the infection in this case was from the throat and involved primarily the renal parenchyma, and secondarily the perirenal tissue. In draining a perirenal abscess it is not always easy to expose a possible focus in the kidney, not advisable to break down a lot of adhesions to do so. The majority get well through simple incision and drainage. A continuance of chills, and temperature point to involvement of the renal tissue and call for renal exploration and usually nephrectomy.

DR. F. W. RICE read a paper entitled **Analysis of the Results in 130 Pregnancies Subsequent to Cesarean Section in 96 Patients.** (For original article see page 591.)

### DISCUSSION

DR. AUSTIN FLINT in opening the discussion referred to the value of Dr. Rice's study in adding to our knowledge of the seriousness of cesarean section. According to his belief it is done too often and for insufficient indications. Dr. Flint insisted that the art of obstetrics requires great skill and those without sufficient experience in that art resort to cesarean section because of its ease, but it leaves a woman who, if she recovers, presents the problem as to how a subsequent delivery should be managed. For example, if she is handicapped by a minor degree of pelvic contraction she adds to the danger of a labor through this pelvis, the added risk of having had a cesarean section. Dr. Flint stated that although at one time he favored the dictum "Once a cesarean, always a cesarean," more recent personal experiences led him to modify this. He thought it was difficult to tell which case was safe and which in danger. The important diagnostic point is the character of the convalescence from the original operation from which it must be assumed that prolonged fever would indicate a defective scar. Likewise if palpation shows a thin uterine wall, a prolonged labor is always dangerous.

Dr. Flint pointed out that a statistical study of this kind should make us more careful about doing a cesarean section in the first place. There need be no question in the presence of absolute indications, but in the elective cases it should only be done for very definite reasons and not because it is easy. In this connection he did not favor the operation for placenta previa because the "long rigid cervix" so often assumed, was rarely present in his experience. He preferred other methods of delivery. Dr. Flint had the same feeling about section in eclampsia, on account of the increased risk. Summarizing his remarks Dr. Flint believed that the way to avoid doing repeated cesarean section is to avoid doing the first one and, if required, great care is necessary to preserve asepsis and not to tie the uterine sutures too firmly, so as to avoid necrosis of the tissues. He believed that a great many of the scars became infected from accidental puncture of the decidua by sutures. Section should always be done early in labor before exhaustion supervenes and no attempt should be made to operate rapidly.

DR. JOHN O. POLAK said that in 1921 he made a study of 2200 cesarean sections done by various operators and it was found that cesarean section has a mortality greater than ordinary abdominal operations. The cases were separated into those which were purely elective, in which the mortality was 2.9 per cent in the hands of such men as J. Whitridge Williams, the late Dr. Cragin, the late Dr.

Studdiford, Dr. Hirst, of Philadelphia, and of several men in Brooklyn and New York. In the second class of cases, which had been previously handled, there was a mortality of 6 per cent, and in those cases with membranes ruptured for a long time, or those which had a long test of labor, had applications of forceps or other procedures prior to section, there was a mortality of 14 per cent. Dr. Polak claimed that any one who gets a mortality of 3 per cent should look very carefully over his methods and that greater care is necessary in the selection of cases for cesarean section. There is one factor, queer as it may seem, which does not obtain in Brooklyn, namely the mental fear of section, for in a subsequent pregnancy, patients who have had a section always want another section. They are not apprehensive. Dr. Polak believed that an important point is the site of the incision. The late Dr. Studdiford had studied this subject very carefully and his conclusions have been carefully accepted by obstetricians, namely, that the lower segment of the uterus in the median line can be incised with less danger than elsewhere. Many are apt to hurry and as a result do not "untorsion" the uterus and are then amazed to note the obliquity of the scar. If one takes into consideration the anatomy of the muscular structure of the uterus, one can readily appreciate what is going to happen to the scar which is made obliquely in the uterine wall, no matter how it is sewn up. Again, those who practiced the low section, found another advantage in the fact that there is a fascia in the lower portion of the uterus which can be brought over the line of sutured muscle, as noted by DeLee of Chicago.

Dr. Polak insisted that, during suturing, it is essential to carefully approximate tissue to tissue, without constriction and to avoid involving the endometrium. The observations of Finley and of Phaneuf subsequently, showed that rupture of the scar is less frequent in the low section than in the high. Dr. Polak referred to the procedure followed in Glasgow by Munro Kerr and Hendry, who use a transverse incision in the thinned-out lower segment. When we realize that in the high section our trouble comes from the fact that we are working in the contractile portion of the uterus, that all infection of the uterine wound comes from the inside of the uterus, and that when we have adhesions it is the result of leakage, we can appreciate that the transverse incision in the thinned-out lower segment of the uterus will leave an intact contracting uterus which will maintain drainage, and finally covering the uterine wound with the bladder reflection makes the procedure extra-peritoneal and adds another safeguard.

Dr. Polak agreed with Dr. Flint that the way to make repeated sections less dangerous is to select the primary sections with care, but believed that there is a place for section in certain cases of placenta previa, because of the necessity in these days of doing obstetrics that produces a live baby and a live mother without much blood loss. He also felt that a large number of these women will go through subsequent labors without complications if watched in the hospital. For it is not the case of contracted pelvis that will go through labor safely, but where a section was done for other indications with a relatively normal child in a relatively normal pelvis.

There was a greater mortality from repeated sections, according to Dr. Polak, than is generally known, because such cases not infrequently have extensive protective adhesions, which become injured during operation. However that protection has not the same resistance as normal structures, and infection and morbidity are therefore higher.

DR. HENRY C. COE referred to the many difficulties which attended this operation in his earlier experience and yet he had not lost any cases, which he attributed to the fact that he was an advocate of the elective operation. Dr. Coe agreed with Dr. Polak about the value of the low median incision, as it avoided weak scars.

DR. ASA B. DAVIS noted that there were about 20 cases in which it was possible to deliver the patient by the natural method, less than one-fifth of those of the total. He did not believe that every time a cesarean section is done it means that the next delivery, or a subsequent delivery, must be by cesarean section, but wherever one cesarean section has been performed, the patient should be in the hospital a considerable period of time, ten days or two weeks before the expected time of labor, and under very careful observation. If she goes into labor, the attendant who is to care for her should remain in the hospital so that there should be a continuity of care, and he should be ready to meet any accident that may come from a rupture of the scar.

At the Lying-In Hospital, in 1924, there were 190 cesarean sections, in 1925, 196, about 3 per cent incidence in all deliveries.

"Measurements of the pelvis are brought up from time to time, but we are learning that measurements do not mean very much. There has been a change in the character of the patients. It is rather rare to see the old time rachitic pelvis or the Nägele pelvis, or similar distortions. More patients are encountered with oversize male type of pelvis. Many of those cases come in with ruptured membranes, the labor drags on, they do not dilate, they are not suitable for high forceps. Occasionally," Dr. Davis said, "we try to ease our conscience and deliver through the pelvis, but after we have gotten through and realize the conditions left behind we are dissatisfied with ourselves. We know we can deliver these cases by cesarean section. We also give the patient a trial labor. We must either deliver the child at a comfortable point or stand by and allow a stillbirth. We do not approve of that."

Dr. Davis recalled a patient who had lost two children. She presented a condition often seen in the male type of pelvis, oversize children with unmouldable heads. She was very anxious to have a live child. He delivered her by cesarean section, of a child weighing over 9 pounds. The next time she came in they dilated the cervix and did a forceps. The next child was almost precipitate. There was a general decline in the size of the children, as proved by their weight, measurements and mouldability of the head.

Dr. Davis had no fear of repeated cesarean sections. One of his cases had had seven and one had six. He believed it very risky to attempt to deliver, or wait for delivery, or allow a patient to go on in labor when she has had a previous cesarean section; and he would like to impress the fact that the surgeon who is to care for the case should be in attendance and be ready to carry the load while the woman is going through her labor, and that as soon as full dilatation occurs, if a trial labor is given, then the labor should be terminated by artificial means.

Dr. Rice in closing said that although English writers agree that rupture does occur less often following the low flap method of operation, in this country we are inclined to withhold our opinion as many cases of rupture are being reported following that type of incision. He felt that if infection was already present, this type of operation offered the best chance; but for a case where it is elective, especially for a temporary condition where there is a possibility for a woman to have subsequent normal deliveries, the low classical was better, because during labor that portion of the uterus is apt to undergo certain physiologic changes which might affect the scar.

Dr. Rice agreed with Dr. Davis that these patients should have more attention in the later weeks of pregnancy, because in a large number of sections it was shown that 46 per cent of the ruptures occurred before the onset of labor, and that we are beginning to get a little careless in allowing the patients to start labor before we perform the repeated section, for damage to the scar may be done before that time, by overdistention.

DR. E. EVERETT BUNZEL (by invitation) read a paper entitled **Pulmonary Embolism Complicating Pregnancy, Labor, and the Puerperium.** (For original article see page 584.)

### DISCUSSION

DR. W. W. HERRICK considered that this paper crystallized impressions that with most of us are rather vague and based on mere clinical observation. Apparently the source of these emboli is not the uterus, but the larger veins of the lower part of the body. The part played by rest in promoting circulatory stasis should be stressed, as in the treatment of both medical and surgical conditions we emphasize rest too much. In the treatment of cardiac weakness, a certain amount of exercise is helpful. The effect of muscular contraction in promoting venous return aids in correcting circulatory stasis. Dr. Herrick believed the same thing holds true in obstetrics; that a certain amount of passive, if not active, exercise may help in abolishing the venous stasis which is undoubtedly a contributory, if not a fundamental, factor in thrombosis and embolism. It may be that passive or active movements, especially in patients who are anemic and who in consequence may have an increased coagulability of the blood, help to ward off this dangerous, although rare, complication.

Mitral stenosis is a cardiac lesion in which emboli are very common. One might think that a woman with mitral stenosis who went through labor would be more likely to show emboli than under other conditions. Under the supervision of the medical service of the Sloane Hospital, about 250 cases of heart disease have been delivered in the last seven years. Of course, the larger number of these cases were cases of mitral stenosis. In only one of them was there a fatal embolus. Embolus in mitral stenosis in pregnancy does not seem to be any more common than in a similar group of nonpregnant cases with that valvular lesion.

One interesting and important point which Dr. Bunzel brought out was the fact that if death occurs, it is in the first hour, in nine cases out of ten. That probably means death from shock.

The best clinical indicator in the treatment of shock probably is the blood pressure, and Dr. Herrick asked the speaker to comment on that if he had the data.

In combating shock he believed the most effective method is the use of frequent doses of adrenalin by deep hypodermic injection, 5 to 7 minims every few minutes, governed by the response on the part of the blood pressure, in addition to the other method mentioned by Dr. Bunzel.

DR. W. E. CALDWELL said that the majority of the cases reported by Dr. Bunzel were among primiparae. In looking over his histories he could not find any history pointing to previous phlebitis or previous endothelial changes in the veins which would lead to the formation of a thrombus. It was always hard to follow Aschoff's idea that you can get a thrombus without previous endothelial changes in the veins. In one of Dr. Bunzel's cases there was a definite history during pregnancy of a callous of the foot that was treated rather extensively and even x-rayed. In that case there was a possibility, of course, of a phlebitis from the foot and the embolus followed an easy breech delivery afterwards.

Dr. Bunzel mentioned the spiral bandage. Unless put on very carefully, you can conceive of its possibly increasing the danger by making pressure on the circular veins. Properly applied, though, it helps. Tight abdominal support immediately after delivery in primiparae in cardiac cases of overdistention is almost impossible with an ordinary abdominal binder.

DR. HENRY C. COE said that his experience with these cases extended over many years. In two instances death occurred within an hour after the attack.

The first was one of flat pelvis in a multipara of forty-two, in whom he did a version successfully on two occasions. Shortly after the second labor she died suddenly of embolism. The second case was a difficult forceps delivery and terminated in the same manner four hours after labor. Dr. Coe said that he had on one occasion actually witnessed the development of a pulmonary embolism after curettement for retained septic placental tissue. The woman had a chill, respirations became rapid and on auscultation he was able to watch the development of an embolism in the lower left lobe. The patient died in a few hours.

DR. GEORGE W. KOSMAK said that Dr. Bunzel's contribution constitutes an observation in a condition that is sometimes passed by with very little notice. He believed, in addition to these fatal cases of pulmonary embolism, there are a good many instances where small clots lodge in the lungs with infarct formation and that our diagnosis is in error. Very often in the puerperium, after five or six days, the patient has a chill, complains of very sharp pain in the chest, the respirations go up and we make a diagnosis of beginning pneumonia, when in all likelihood she has an infarct due to a small clot lodged in some part of the lung. Fortunately, a great many of them get well.

Dr. Herriek expressed very effectively what Dr. Kosmak believed to be one of the principal causes of this accident, namely, slowing of the blood current, and that we should take a lesson from those who have demonstrated this and who have warned us about the importance of active exercise by the patient after delivery. In many instances we are prone to leave the conduct of the puerperium in the first few hours, or the first twenty-four hours, to the discretion of the nurse. He had often observed a patient flat on her back twelve hours and longer after delivery and when she is told in the nurse's presence to turn around and move about, wave her arms about, and even turn over on her abdomen, the nurse looks on in horror and apparently considers that this doctor knows very little about the after-care of the patient. We should instruct our patients to make active movements as soon as they are able after delivery. Dr. Kosmak believed that the reason we get more of these emboli in the operative cases is because these patients are kept quiet a longer time, often flat on their back for twenty-four hours or more before being allowed to move about. If patients are unable to move about, passive exercises can be employed to accelerate the blood-flow, as some of these patients are more or less helpless for a day or two.

In women who are unduly distended and in whom a rapid emptying of the uterus takes place with a corresponding disturbance in the mechanics of the circulation of the abdomen, a rigid, firm abdominal binder, or the adhesive plaster dressing of Dr. Studdiford, is of great value, and in some of these cardiac cases particularly, the application of a sandbag for a few hours after labor helps to keep the uterus well contracted and the abdominal vessels more or less empty.

If these precautions are observed in all our puerperal cases, we will get much smaller incidence of this fatal condition.

DR. GEO. G. WARD referred to the value of Aschoff's work, which demonstrated that the lack of exercise and enforced rest after labor or operation slowed up the blood stream sufficiently to make this a definite factor in the pathology of thrombosis. Dr. Ward recalled the apparatus used in Sellheim's clinic in Tübingen, in which a system of levers worked by an electric motor, the limbs could be flexed and extended mechanically. Dr. Ward also referred to the treatment developed by Prof. Brandt, of Oslo, in which a particular form of massage of the leg is employed in the presence of puerperal thrombophlebitis. This is termed "effleurage" and consists of a particular form of superficial but firm stroking of the leg, to stimulate the lymphatics and increase the blood flow. Of course the temperature must have



subsided. Dr. Ward likewise believed that there are many more cases than we realize and that there are many instances of mild showers of minute emboli liberated in the blood stream that give rise to pulmonary symptoms which are usually put down to a possible pneumonia, or pleurisy.

DR. E. EVERETT BUNZEL, in closing, believed that the custom followed in some of the European clinics of allowing the patients to get out of bed on the first day after delivery in order to stimulate the circulation, would not meet with a ready reception in this country. For if by any chance a patient so treated should develop an embolus, the attending physician would have great difficulty in explaining his attitude. In answer to Dr. Herriek's question about blood pressures, no deductions were possible because of the small number of observations, but where recorded, the blood pressure was invariably low.

With reference to endothelial damage to veins, Dr. Bunzel considered that this might occur during pregnancy in patients who complained of muscular cramps in the legs. As active rubbing is usually resorted to, the resultant disturbance may be a pathologic factor in the formation of a thrombus of the saphenous veins. For this reason he cautioned against massage or rubbing of the lower extremities as a measure of preventing thrombosis.

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## BROOKLYN GYNECOLOGICAL SOCIETY

STATED MEETING, NOVEMBER 5, 1926

DR. T. S. WELTON, THE PRESIDENT, IN THE CHAIR

DR. H. J. STANDER, of Montreal, read, by invitation, a paper on **Clinical and Experimental Studies on the Toxemias of Pregnancy**. (For original article see page 551.)

### DISCUSSION

DR. JOHN O. POLAK said that a leading fact brought out is that the eclamptic patient is an extremely poor surgical risk. Dr. Polak had noted, from a clinical standpoint, the immense drop in pressure immediately after delivery, the poor resistance of the patient to anesthesia, and had come to the conclusion that anesthesia was the thing to be avoided, and on that basis had for several years been practically following out the treatment suggested with the single exception that he still used venesection in an extravagant manner, possibly taking away a few of the toxins in the 1000 c.c. withdrawn. His results from this plan of treatment, with morphia used very freely, have been excellent, and Dr. Stander has demonstrated by his experimental work why morphine works.

DR. CHARLES A. GORDON wondered whether Dr. Stander had included in his blood chemistry investigations any cases that showed marked edema. This has always been looked upon as a protective mechanism of some sort, less marked in those who develop convulsions.

At St. Catherine's and Greenpoint Hospitals, he had never been impressed with the value of venesection and had used morphine in large doses. He also tried out magnesium sulphate for a long time and had no success whatever with it.

Dr. Gordon marveled at Dr. Stander's statement that the neurotic vomitings of pregnancy have disappeared and that they are all toxic of some sort. It seemed to him, from a large experience with cases of vomiting, that a considerable number of

patients are neurotic, and a great many of them have been cured by him when treated along those lines, without any attention being paid to any toxic phase of the matter whatsoever.

DR. WILLIAM PFEIFFER said that he had adopted a method of giving an initial dose of  $\frac{1}{2}$  gr. of morphine, continuing with  $\frac{1}{4}$  gr. every hour thereafter until the respirations dropped to 8 per minute or convulsions ceased, plus venesection, stomach washings, colonic irrigation, etc. Seeking to simplify the method a little, in the last two years, he had been using almost exclusively magnesium sulphate intravenously and large amounts of glucose,—250 c.c. of a 20 per cent solution. He never delivers a patient unless in labor; perhaps rupturing the membranes, and that is all.

Based on Dr. Beck's question, if, in spite of the fact that anesthesia lowers the  $\text{CO}_2$ , Stroganoff persists in it, maybe there are cases that have enough  $\text{CO}_2$  reserve to stand the drop occasioned by the use of the magnesium sulphate. In other words, where does the good come from, for our results in eclampsia by the use of magnesium sulphate have been just as good as in the old days of morphine.

DR. H. W. MAYES said that the intravenous use of magnesium sulphate is not without danger. It was used at the Methodist Episcopal Hospital in several cases and two patients died soon after its use; in another case the respirations stopped soon after its administration and the patient was resuscitated by the use of alpha lobelin and artificial respirations.

DR. STANDER, in conclusion, said that they used the ophthalmoscope in all toxemias. In the nephritic patient there are sometimes very definite evidences of nephritis from the ophthalmoscopic examination and it often clinches the diagnosis, because, if there is an exudate and an albuminuric retinitis, there are signs of nephritis. In the eclamptic patient, the nephritic changes in the eyegrounds are not seen. The most marked findings are detachment of the retina and edema of the retina. The two pictures are quite distinctive. The ophthalmoscope does not help in all cases, but only in a small percentage of them. Where it helps, however, it is of very definite value, just as a positive Wassermann reaction. Because a patient has a negative Wassermann does not necessarily mean that the patient has not had syphilis.

As regards the high uric acid, the work of Mann in Rochester, Minn., shows that injury to the liver leads to an accumulation of uric acid in the blood stream. Dr. Stander considered that the high uric acid is associated with liver injury in eclampsia; but, whether it is the cause of the picture or functions at all in the cause of the picture, he could not say. It certainly helps in the diagnosis of eclampsia.

With reference to Stroganoff and chloroform, the results are very good, although Dr. Stander believed that we deal with different types of eclampsia in different parts of the world and in different parts of this country. The eclamptic patients at Johns Hopkins are very severe cases because usually they are seen after they have had four or more convulsions and have been neglected. The eclamptic cases which Stroganoff gets are usually very mild eclamptics, and over 70 per cent of the cases whose records he saw in Stroganoff's clinic, in Russia, were cases that developed eclampsia in the clinic. In other words, they had a chance to study and to treat the patient just as she was developing the eclampsia; and she had one or two fits only. On the contrary the Hopkins cases enter the hospital with convulsions and have usually been neglected.

Dr. Stander claimed that if Stroganoff omitted chloroform, he might get even better results. Certainly he did not want to use chloroform in view of what he had seen that it can do to the liver and to the blood picture.

In regard to magnesium sulphate Dr. Stander said that he had had no clinical experience with magnesium sulphate. He had only experimented with it in animals

and more experimental work is necessary before his results can be definitely put down as final. He could conceive of magnesium sulphate doing good in certain cases and yet doing the two things he showed it does. To use it indiscriminately and for all cases we should be doubly sure that we are not superimposing an injury on a liver that is already injured, and that we are not producing a blood picture that is similar to that in eclampsia. At present he believes that magnesium sulphate injures the liver and decreases the  $\text{CO}_2$ -combining power.

Dr. Stander felt that the clamptic woman without edema is harder to treat than the eclamptic woman with edema. No work had really been done on edema in the toxemias of pregnancy on which he could base any opinion.

Dr. Smith asked about nitrous oxide and whether the picture in nitrous oxide is similar to that produced by ether or eclampsia. The picture is quite similar, but not so pronounced. Acidosis and a hyperglycemia can be produced, and liver lesions can be produced, but not as marked as in these others, yet the changes are very definite.

In regard to "neurotic vomiting" Dr. Stander believed all vomiting had a metabolic or an organic basis; that the neuroses in women may figure largely in the development of the vomiting, or in the further progress of the vomiting; that it is the man who can differentiate keenly and correctly between how much of the neurotic element and how much of the true organic or metabolic element is present, that can treat the "neurotic vomiting," or rather can treat the "vomiting of pregnancy" best. He believed that in all cases there is a metabolic basis that starts it. In some women the neurotic element figures much more than in other women, because a small organic lesion might perhaps have no effect on one person, whereas in another it may set up a whole string of symptoms.

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## OBSTETRICAL SOCIETY OF PHILADELPHIA

*STATED MEETING, OCTOBER 7, 1926*

The Program for the evening was furnished by the Obstetric Department of the Jefferson Medical College.

DR. JACOB WALKER reported an instance of **Separation and Fracture of the Ascending Ramus of the Pubis Complicating Spontaneous Delivery.** (For original article, see page 623.)

### DISCUSSION

DR. DANIEL LONGAKER considered this case very interesting; he thought the operation of symphysiotomy and pubiotomy which he, like some others, was tempted to do a few years ago, resembled the accident to Dr. Walker's patient. The fact that so serious an accident may occur in a spontaneous labor is noteworthy.

At a former meeting of the Society he had reported several cases of rupture of the uterus during spontaneous labor, an accident of even greater gravity.

DR. THAD D. MONTGOMERY read a paper on **The Morbidity and Mortality of Cesarean Section.** (For original article, see page 610.)

DR. EDWARD E. MONTGOMERY said that when he began the study and practice of obstetrics the profession was governed by the dictum "meddlesome midwifery is bad." During his early practice he noted the great frequency of cran-

otomy in Philadelphia, one of the general practitioners having had the credit for having delivered nineteen women in this way. He read a paper forty-three years ago on the subject, "Is Craniotomy on the Living Child Justifiable?" in which he adopted the dictum, "the obstetrician should control events and not be controlled by them." Dr. Montgomery took the ground that the man who is going to attend the woman in confinement should know in advance her condition, the possibilities that her condition presents and be ready, if necessary to deliver by cesarean section in cases where it is justifiable, or to practice premature labor, the application of forceps, or version. He especially emphasized the fact that cesarean section should be performed in the cases justifying it as an elective procedure and not subject the patient to various methods of procedure in anticipation of a spontaneous delivery. The statistics as given here, demonstrated that a woman delivered by the horn of a cow had less mortality than one delivered by the knife of the surgeon, because in the latter case it was done as a last resort rather than at the beginning. Dr. Goodell in criticism said that he (Dr. Montgomery) had compared ovariectomy and cesarean section, as an elective procedure, with equally low mortality, but the presence of an ovarian tumor gave rise to certain immunity against peritonitis and infection and that such patient could be operated upon successfully, while a woman who was pregnant had not secured the immunity. He then instanced a case in which he removed a large ovarian tumor (125 pounds), and the patient recovered without any unpleasant symptoms, while the same week a man admitted to the University Hospital, who had been stabbed by a simple puncture of the peritoneal cavity, had died of peritonitis. In reply Dr. Montgomery suggested to him that cesarean section should be done under aseptic precautions and that he could hardly claim that this man had been so stabbed.

DR. LONGAKER admitted thirteen craniotomies. A list including eleven of these was made the basis of a paper which he read before the Philadelphia County Medical Society a few years ago. It was at this time that the late Dr. Robert P. Harris was doing such excellent work in tabulating the results of the cesarean operation and no reference to the history of this operation is complete without mention of the work and influence of Harris.

Discouraging as were the results of the operation through the eighties, he was ever optimistic about its ultimate success and especially so when he, Dr. Longaker, reported, in 1890, his first successful cesarean section, one of the early cases of the modern operation in this part of the country.

In regard to his own results, Dr. Longaker had operated one hundred and three times, losing four mothers, a maternal mortality of under 4 per cent. The women who died had forceps used unsuccessfully or the operation was done under bad conditions, actual or potential infection being present on or before the operation.

It is especially in the cases of placenta previa that miraculous results may be obtained by the cesarean operation supplemented by transfusion by the direct, whole blood method. This was forcefully illustrated in a recent case of complete placenta previa; the patient was bled white, the entire operation being practically bloodless. The abdominal incision reminded one of cutting a cadaver. Hardly an ounce of blood was lost, the placenta being slowly shelled out of the cervix. This allowed time for thrombosis of the sinuses and retraction of the lower uterine segment. Transfusion from a suitable donor was begun at this point and as closure of the abdominal incision was about complete, blood began to ooze from the needle puncture and the skin margins. Color returned to the lips with 700 c.c. of whole blood. Recovery was uncomplicated and mother and baby left the hospital in two weeks.

DR. RICHARD C. NORRIS said that the borderline cases have always been an important problem in obstetrics. Whether the low transperitoneal section really brings added safety to the case that has had a real test of labor, with possible con-

tamination, and many hours of ruptured membranes, should be and is being tested out in many obstetric clinics. The results obtained by DeLee in Chicago, Bailey in New York, and Polak in Brooklyn, are encouraging. Clinics and teaching hospitals where more or less neglected cases are, and always will be, received, should continue to test out the low operation.

If we abandon a real test of labor, i.e., several hours of strong second stage pains, in these borderline cases, we shall undoubtedly do more cesareans than are justified. If during this real test the patient is properly safeguarded from infection, possibly by rectal examination only and if we abandon high forceps, Kielland's as well as all others, and determine the true status of the cervical cesarean operation under such conditions, which he personally believed will become the operation of choice in such cases, we shall have made a most noteworthy advance in practical obstetrics.

DR. JAMES F. CARRELL read a paper on **Perineal Injuries During Parturition**. (See page 627.)

### DISCUSSION

DR. P. BROOKE BLAND said he was firmly convinced that in the vast majority of cases, a primary repair offers a great deal more satisfaction than a secondary or intermediate correction. There are certain cases, however, for example, patients who have been in labor a long time and in whom, owing to prolonged pressure, the soft parts are more or less disorganized, that an intermediate operation or better still a secondary procedure is preferable. In patients in whom the soft parts have not been exposed to prolonged pressure with devitalization of tissue, he believed primary repair should invariably be performed and he personally preferred a reliable chromicized catgut exclusively. He never used silkworm gut or other nonabsorbable material.

The success of a perineal repair is perhaps not dependent so much on the material used, but on the manner in which it is used. Through and through sutures, especially if tied tightly, will not suffice and likely do more harm than good. It is essential that the parts severed be restored along strict anatomic lines. It seems to him that if dependable catgut is sufficient for secondary, it should be equally good for primary repair. A damaged perineum, properly sutured, will surely heal in from seven to ten days and catgut will easily hold firmly for that period or even very much longer. It should be pointed out that there is no need for strongly and firmly apposing the severed tissues. This chokes or strangulates the structures and this feature is objectionable in the perineum as it is elsewhere, if not more so.

Silkworm gut invariably leaves a hard, firm, dense "silkworm gut scar." Fine catgut, No. 0, for the skin perineum, leaves a very fine scar and in many cases no scar at all.

DR. RICHARD C. NORRIS said that there is no means of protecting the perineum and vaginal walls, with uniform success. We know oftentimes the structures are unduly fragile and more readily lacerated. He mistrusted the claims of those who manually dilate the soft parts and claim to do in fifteen minutes what nature will not do in several hours and did not think it is possible for anybody to do that without producing submucous lacerations. Nature, with her slow dilatation, shows that it is impossible in a large number of patients, to avoid overstretching and lacerations. The upper third of the vagina and the upper pelvic diaphragm are the portions of the vagina where injuries occur, which are of the greatest importance to the patient's future pelvic comfort. Up to the present time we have no means of protecting these tissues short of cesarean section, except prophylactic obstetrics, i.e., not applying forceps too soon, slow intermittent traction and avoidance of the abuse of pituitrin in the early stages of labor. So, with due regard for the upper portion

of the birth canal, our older methods of delay and gradual dilatation, are not to be discarded. To carry the patient, especially primiparae, through this stage, twilight sleep or better, rectal analgesia, finds its greatest field of usefulness. The management of the lower or outlet pelvic diaphragm is more directly under surgical control. Dr. Norris was surprised to note in this report from the Jefferson Hospital, so few episiotomies. His experience with that operation had been so satisfactory that it is almost a routine procedure with primiparae. Whether to do a lateral, mediolateral, or median operation was no longer a question, and the median or central is his choice. An incision through the central tendinous union in the perineal body releases the important fascia at the outlet. If the incised fascia are brought into proper apposition when the incision is closed, there will be no need to bother with the muscles. The principle is the same as in closing the fascia of an abdominal incision. In closing a lateral episiotomy there is a lozenge-shaped wound which is difficult to repair and when properly repaired, scar tissue is left which is painful for a long time to the patient when she sits down; it is mainly for that reason he discarded it. About 95 per cent of the primiparae he now delivers have outlet forceps and a median episiotomy.

The only danger of central episiotomy, is that it predisposes to laceration of the sphincter unless that muscle is properly safeguarded. In these rigid cases it is valuable to forcibly dilate the sphincter, change gloves, and place a temporary figure-of-eight silkworm gut suture around the anterior segment of the sphincter to protect it in the median line. That is one way of saving the sphincter, and the other is the very slow intermittent delivery. Incision should be made from the point of constriction made by the taut transverse perineal constrictor vaginae, and the anterior fibers of the levator muscles, felt on the posterior vaginal wall, downward in the median line to the sphincter ani.

Dr. Norris did not agree with Dr. Bland that only absorbable sutures should be used. It is not well to depend entirely on catgut in the puerperal vagina, which seems to possess a remarkable power to digest and prematurely absorb even forty-day gut, which should always be used. He found so often that while there is a beautiful approximation of the tissues by using catgut alone when the operation is finished, in four or five days the knots tied close to the rectum are prone to become infected and if stay sutures of interrupted silkworm gut are not used in the perineal body, the operation will sometimes be a failure due to the premature absorption or infection of the catgut.

He concurred with Dr. Bland that the same principles should prevail here as in an abdominal wound. A submucous catgut stitch is used to unite the fascia and their attached and retracted muscles, in the median line, from the apex of the incision to what will be a new fourchette. Before introducing this suture, three interrupted silk-gut sutures are placed to bring together the incised perineum, the first one placed as is the crown suture in Emmet's perineal operation. They do not perforate the vaginal mucous membrane. These sutures are not tied until the continuous catgut suture has been completed as just described.

Since episiotomy only protects and repairs the lower third of the vagina, before closing the episiotomy wound, the upper two-thirds of the vagina and the cervix should be inspected and palpated. Extensive injury to the cervix should be repaired. Slight lacerations above the field of the episiotomy incision, should also be closed, and submucous interrupted catgut sutures are used. In primiparae, unless the upper two-thirds of the vagina is inspected regularly, one will be surprised to find how often varying degrees of laceration are overlooked. Episiotomy is a distinct obstetrical advance. Why? Because it is preventive. It is valuable because primary union is obtained where bruised tissues would not give as many good results. The most common injury of labor, overstretching and laceration at the outlet, involving the anterior fibers of the levators and the perineal muscles with their fascial sheaths

and attachments is prevented. The door for the passage of the head is opened; then the door is closed with properly applied sutures. Six weeks later an examination discloses an almost intact vaginal outlet.

In the future perhaps somebody, Dr. Norris felt, would devise a method for preventing injuries to the upper pelvic diaphragm, analogous to what episiotomy does for the lower pelvic diaphragm. The low abdominal cervical cesarean section, is our only available surgical means at the present time. Vaginal hysterotomy, which served that purpose to some extent, has never been popular in this country.

DR. HARRY STUCKERT read a paper on **The Advantages of Rectal Palpation During Pregnancy and Labor.** (For original article, see page 642.)

#### DISCUSSION

DR. NORRIS W. VAUX said he had never been able to get any result from rectal examinations for he could not get two fingers in the average woman's rectum without giving a lot of pain and he could not find with one finger what he should like to feel by vaginal examination with two. He believed there is a great deal of onus thrown on vaginal examination that does not belong to it and that one careful vaginal examination is much more satisfactory than half a dozen rectal examinations. In regard to puerperal sepsis, Dr. Piper, told him that the last five cases that he had seen had no rectal or vaginal examinations made. Personally, he did not think there is danger in vaginal examinations when the patient and surgeon are properly prepared, but in the rectal examination, the perineum may be contaminated with colon bacillus and other bacteria that might find their way into lacerations later in delivery.

DR. P. BROOKE BLAND was convinced that vaginal examination performed by skilled hands in patients approaching or in labor may not be associated with serious, if any grave danger, but when indiscriminately or carelessly performed it carries a real menace. Theobald, in a recent number of *The Lancet* (September 25, 1926, p. 636), stated: "I have been trying in vain to discover an authentic case of fatal sepsis that occurred in a woman who had never been examined vaginally. I certainly have never seen such a case." This statement, of course, was difficult to accept literally, and was altogether too sweeping. Dr. Bland considered that the vaginal method was utilized to an unjustifiable extent and was indubitably responsible for some or perhaps even a great many cases of infection. Hence, he was equally certain it has crippled and killed a large number of women.

Dr. Stuckert had properly emphasized the place rectal examination should hold in routine obstetric work. This procedure was not new. It was advocated by Velpeau one hundred years ago and here in Philadelphia, Charles D. Meigs taught, recommended, and practiced the method as early as 1853. Indeed, these celebrated obstetricians claimed to get along very well in most cases by limiting their study to an examination of the abdominal wall.

Theobald claims that in 95 per cent of his patients he relies largely on careful inspection and palpation of the abdomen. A very interesting little book, recently from the English Press, *The Abdomen in Labor*, likewise emphasizes the importance of inspection of the abdominal wall. The author, Dr. Porritt, regards digital exploration of the vaginal canal, unless done with meticulous care, are rarely necessary. "Meddlesome midwifery" he says, "is bad, but systematic examination of the abdomen makes it less meddlesome."

As a teacher, Dr. Bland was convinced that we are not justified in having our students leave with the impression that they may perform the vaginal examination indiscriminately. They must be taught its dangerous side and that other and safer methods may be used.

Naturally, in maternity hospitals, the vaginal procedure is performed with due regard to surgical cleanliness. If done any other way, it is a damnable piece of business and exceedingly bad practice. It is in general obstetric work, especially, that trouble arises. The general practitioner, the man who of necessity is 33 per cent obstetrician, must be taught the importance of keeping the unclean, the unprotected hand out of the vagina.

To the students, our prospective obstetricians, the value of rectal investigation as portrayed by Dr. Stuckert must be pointed out. We cannot afford to have 25,000 mothers die in this country every year, as the result of bad obstetrics. There is something woefully wrong and Dr. Bland felt that the careless vaginal examination had a great deal to do with the situation.

Finally, that vaginal examination performed by the skilled obstetrician affords a wider range of exploration and hence provides more detailed information no one will deny, but that it is a wise and safe recourse in the hands of the general practitioner, on whom the brunt of obstetric work falls, is, he believed, exceedingly doubtful. If the vaginal method is not fraught with real danger, why are the men who advocate the method so reluctant to perform an operative delivery, especially abnormal delivery, on patients thus handled?

DR. WM. E. PARKE said for several years he had practiced rectal examinations, and after considerable experience believed he could learn by it almost as much as by vaginal examinations. Those who are doing Potter versions are not afraid to invade the vagina, and so with this in mind he had lately abandoned somewhat this procedure. He did believe, however, that it is a worth-while method where repeated examinations are made over a long time.

DR. EDWARD A. SCHUMANN believed that if the student cannot be taught to make vaginal examinations he cannot be taught to do obstetrics on the basis of asepsis and if he cannot be sure of asepsis he certainly should not enter the vagina under any circumstances. Furthermore, he thought that every man who had seen hospital obstetrics would admit that puerperal sepsis originating in maternity cases is extremely rare, even when repeated vaginal examinations have been made. Dr. Schumann agreed with Dr. Vaux that the information to be gained by the rectum is incomparably less than that to be gained by the vaginal examination, and in his experience the former is a refinement not at all warranted by its results.

DR. G. VICTOR JANVIER said that in unclean slums and country homes, the environment is entirely different from a clean hospital where vaginal examinations can be made with more or less impunity.

He agreed fully that all students and practitioners should learn to make rectal examinations.

The general practitioner handling all kinds of infectious cases should always make rectal examinations and should learn to familiarize himself with the feel of the os and the sense of the descending head.

There is just as much logic in decrying rectal examinations in obstetrics, as there is in omitting the thorough aseptic preparation of the woman's vagina before vaginal examination.

DR. JOHN A. McGLINN was convinced, in view of the number of infections which are continuing to increase in spite of our better obstetrics, that any aid to the reduction of the incidence of infection should be adopted. He personally, however, had no faith that the general use of the rectal examination was going to diminish infection because he was not convinced that vaginal examination even if made improperly, is the great cause of puerperal infections. He would not think of making a vaginal examination without preparing the vulva or properly guarding his hand with a rubber glove because it would hurt his surgical conscience to do otherwise,



but when we think of the millions of cases of intercourse near term in which infection does not occur, and the tremendous number of vaginal examinations which are made improperly, it would seem that many more women would be infected, but they are not. There is something more than mere vaginal examination even with an infected finger that is responsible for them. As Dr. Vaux stated five of Dr. Piper's patients had never had a vaginal or a rectal examination and Dr. McGlinn knew of a patient with puerperal infection with hemolytic streptococci, who never had a vaginal or rectal examination, and a perfectly spontaneous delivery without a tear of the mucous membrane.

DR. RICHARD C. NORRIS said that it is generally agreed that frequent vaginal examinations in labor are dangerous, and even one examination, if not properly safeguarded, carries a risk of infection. The dangers of vaginal examinations made by one trained in a proper technique, were, he believed, exaggerated. What the average practitioner wants to know is whether the head is coming down into the pelvis and the degree of dilatation. Rectal examination will give that information. For accurate diagnosis, however, it will not replace vaginal examination. However great the skill acquired by experience with the rectal route, the latter is not wholly free from danger. Bacteria in the vagina can be pushed into the cervix by the rectal examining finger. Serious, even fatal infections can occur in women with no examination. We should not deery rectal examinations and say they have proved of no practical value. For the busy physician in his daily rounds, untrained in surgical technique, and prone to make frequent examinations, rectal examination is a blessing to the woman and a good thing for the doctor.

DR. JOHN C. HIRST said that the most important factor is the question of morbidity, concerning which, no one spoke this evening.

He would like to state that the maternal morbidity was effectively reduced by adopting the following routine at the maternity ward of the University:

No vaginal examinations are made by the resident physician while the patient is in bed. The patient is put on the table, carefully scrubbed and painted with 2 per cent mercurochrome solution in alcohol, and the house doctor makes *one* vaginal examination for the diagnosis of presentation and position. Following this, in order to note the progress of labor, the house physician makes all examinations by rectum.

DR. THAD L. MONTGOMERY believed, in discussing this question, one ought to get the attitude of the general practitioner as well as that of the men who are practicing obstetrics in the hospitals of this country. Such a man had told him that in recent years the greatest help in his practice of obstetrics was rectal examination. He could make diagnoses of labor by rectal examination, could follow the progress of the fetal head, and that that combined with abdominal palpation gave him all the information that he needed in the vast majority of cases; then if there was delay and he could not determine the cause of it by other means he prepared the patient carefully and made a vaginal examination. The general practitioner is still delivering the majority of obstetric cases in this country. Patients coming to the hospital should have if necessary, vaginal examinations. Dr. Montgomery believed that both should be taught to students and that both were of value of their respective indications.

THE AMERICAN ASSOCIATION OF OBSTETRICIANS,  
GYNECOLOGISTS, AND ABDOMINAL SURGEONS

THIRTY-NINTH ANNUAL MEETING

CHICAGO, ILL., SEPTEMBER 20, 21, 22, 1926

THE PRESIDENT, DR. GEORGE CLARK MOSHER, OF KANSAS CITY, IN THE  
CHAIR

DR. THURSTON WELTON, Brooklyn, N. Y., read a paper on **Prenatal Study and What It Accomplishes**. (For original article see page 494.)

DR. JOHN OSBORN POLAK, Brooklyn, N. Y., discussed **Postpartum Care and Follow-Up**. (For original article see page 432.)

DR. CHARLES A. GORDON, Brooklyn, N. Y., (by invitation) read a paper on **The Conduct of Labor and the Management of Obstetric Emergencies**. (For original article see page 501.)

DISCUSSION

DR. EDWARD SPEIDEL, LOUISVILLE, KY.—I believe that the most important feature in prenatal care is the elimination of fear. When you realize that in former days, when a physician was not called to the pregnant woman until she was in labor, that during her entire pregnancy she received the improper advice and heard the exaggerated tales of previous labors from her elder sisters, and that every novel of that day depicted the birth of the child as the passing of the woman through the valley of the shadow of death, it is natural to assume that the enormous mortality of those days was not entirely due to primitive obstetrics, but that fear was also a great element. Today a woman selects an obstetrician, places herself in his charge, gets her advice entirely from him and enters upon the period of labor with the assurance that she will be delivered safely, and she is free from anxiety throughout the whole time. This is not only the case in private practice but is even more so in hospital practice, especially in the large prenatal clinics. The fear of the hospital has been removed from the people. In the prenatal clinics the patients visit the hospital at frequent intervals and in consequence when the time for labor arrives they are fully acquainted with their surroundings, and the element of fear is removed.

The second important consideration is that in consequence of prenatal care the physician has a thorough knowledge of the patient's physical condition and recognizes and corrects any physical abnormalities as far as possible during the period of pregnancy. He at once recognizes and in most instances can arrest the early and late toxemias and consequently brings his pregnant patient up to the period of labor in a splendid physical condition.

The third important element is that in consequence of prenatal measurements, abdominal palpation, vaginal examination and diagnosis of presentation and position as well as the size of the pelvis, the physician is able to predetermine his method of delivery and to provide for any abnormalities that may occur, and he is consequently not taken by surprise as was often the case when he first saw the patient in labor and had made no examination of any kind before that time.

It is not surprising therefore that maternal deaths have been greatly reduced, that the toxemias are almost eliminated from private practice, and that even in our hospital practice the eclampsias are usually the neglected emergency cases from outside.

DR. JAMES QUIGLEY, ROCHESTER, N. Y.—I wish to endorse all that Dr. Polak has told us with regard to the postpartum care perhaps with one exception. I cannot agree with him in neglecting to watch the fundus in the third stage and I cannot see what would prevent it from ballooning up, with the placenta acting as a ball valve in the cervix. I have seen several cases where the uterus would fill up with a large amount of blood. I do not think the fundus should be manipulated but simply watched.

DR. IRVING W. POTTER, BUFFALO, N. Y.—I have always supported the breast with a sort of sling, and it has worked fairly well, but the adhesive strapping is a much nicer and neater arrangement and will probably appeal to the patient more than the sling.

I likewise believe that the elimination of fear has much to do with the comfort of the patient, but I do not believe that the uterus will balloon up, as has been said, if we shorten the second stage of labor. The uterus balloons when it is tired out. If the patient has had a long second stage of labor the uterus will fill up. If the long second stage of labor has been eliminated there need be no fear of the uterus ballooning in my experience.

So far as interfering with the progress of labor, I believe it is our duty to make it as short, as painless, and safe as possible for the individual; and when we do that we get better involution of the uterus, and the natural well-being of our patient, which we do not get otherwise, is assured.

I do not believe episiotomies are so necessary. I have never done one and have the firm belief that many are done needlessly.

DR. G. D. ROYSTON, ST. LOUIS, MO.—It is interesting to know that Dr. Polak discards vulval pads and if to this progressive step the prohibition of the use of all douches as well as sponging the repaired wound be added, much could be done to stop all meddlesome interference with the healing of a repaired traumatized tissue.

I agree with Dr. Gordon that the general practitioner and medical student must be taught enough surgical procedures that they can safely perform with the facilities within their means, since competent specialists are not everywhere available and too much of what is now being taught is over the heads of those most in need of it; too many major facts to the neglect of simple ones.

DR. FRANCIS REDER, ST. LOUIS, MO.—The pessary is an almost forgotten appliance. There are, however, many instances where it is an exceedingly valuable aid, as for the support of a uterus in the puerperal state, because there is present a physiologic rather than a pathologic condition. A properly fitting pessary will secure effective puerperal involution of the supporting structures of a retro-deviated, subinvolved uterus and will correct the malposition and sustain the uterus in a position of anteversion. But when is it the proper time to use such an appliance? There is a period between the tenth and fifteenth day in the puerperium when the uterus is still too large to retrovert. At that time the uterus should be thrown into strong anteversion bimanually and a well-fitting, hard rubber pessary of the Hodge type introduced to hold it there. It is really remarkable how readily involution, with the aid of hot douches, will be facilitated. At the end of a week, on account of contractions of the soft parts, a smaller sized pessary will have to replace the original one. During the next week or ten days a still smaller one is to replace the preceding pessary. This procedure is to be continued at intervals of from three to four weeks until the uterus is but little above the normal size.

The douches are carried on for four or five weeks until the uterus is near normal size. They should then be intermitted so as not to invoke a hyperinvolution which might cause a subsequent dysmenorrhea. After two or three menstrual periods the pessary can be removed and the patient is usually in an almost normal condition as far as her back and her pelvic organs are concerned. We must bear in mind that the so-called anatomic accessories to the uterus are all muscular and are just as much a part of the uterus as a porch is a part of a house. During pregnancy they evolute and during the puerperium they involute with the uterus. It may be an oversight on the part of the doctor that he does not look after the welfare of his patient long enough after her confinement. If you will allow a subinvolved uterus to lie in a retroverted position, the round ligaments will not possess a sufficient tension or strength to sustain the uterus when placed in its normal position at the end of their involution.

DR. DAVID HADDEN, OAKLAND, CALIF.—I agree with Dr. Polak that the median section of the perineum is the most rational. The lateral incision cuts across not only the fascial layer but the muscle belly as well. A median incision cuts through nothing but the elastic tissue of the central tendon. The value of doing a median perineotomy and thus saving the anterior structures depends on the fact that the fascial layers of the triangular ligaments which support the muscles are anterior to a line joining the tuberosity of the ischia. Prolonged tension over this area may cause the fascial layers to split anywhere. They are as likely, in fact more likely, to give way at their attachment to the pubic arch and that allows of a sagging of the anterior vaginal wall.

DR. ARTHUR J. SKEEL, CLEVELAND, OHIO.—Lifting up the uterus and compressing the vessels to prevent hemorrhage, we have done for a number of years and find it far superior to the old method of pushing the uterus down and massaging the fundus. One is not only able to compress the uterus directly against the lumbar vertebrae, but to compress the vessels supplying it.

With regard to the choice of incision in the patients who have normal pelvic outlets one can very successfully use the median operation and have plenty of room for the head to come through without tearing into the rectum. But when one attempts to deliver a patient who has marked narrowing of the pubic arch the lateral incision is preferable. It does not make much difference what muscles you cut—you must cut laterally because the median episiotomy will tear into the rectum and you have a complete repair to do afterward.

DR. ALBERT GOLDSPOHN, CHICAGO, ILLINOIS.—I am very much pleased to see that prevention of uterine displacement is becoming a part of postpartum care. In discussions I have declared many years ago that retroversion cannot be cured by a pessary except in a very small percentage of cases. The pessary and other means for curing retroversion must be applied when involution is still due in that uterus. The round ligaments are the chief structures that will correct the difficulty as they are properly a part of the uterus, as taught by a German anatomist, Luschka, who showed the continuation of the uterine fibers from their several uterine layers into and composing the round ligaments. We cannot expect that relieving the tension on the round ligaments will cause them to shorten unless we have involution of the uterus as the chief feature in the process. The proper correction of positions and mode of walking are very excellent, but alone they will not be successful. The uterus will be retroverted and the retraction of the round ligaments will not occur. It will be necessary to have a pessary there to retain the uterus in position continually and to relieve the objectionable pressure of the pessary by these changes of posture, knee-chest and other postures.

DR. EDWARD J. ILL, NEWARK, N. J.—I did episiotomies in my student days in Vienna, but in my private practice I discarded it years ago. I want to urge

never to sew up a perineum right after labor, as the tissues are very much swollen and edematous. If you will look at the sutures placed directly after labor they will hang perfectly loose because the edema has disappeared.

One reason I speak against episiotomy is that dissections have shown that a tear does not exist down there; it usually occurs to the right or left of the median line of the vagina. It is not the muscles but the fibrous tissues that tear.

DR. PAUL T. HARPER, ALBANY, N. Y.—Apropos of stimulating normal and rapid involution and preserving the integrity of the cervix, to which Dr. Polak referred in his paper, I want to urge the utility of version and extraction in meeting one of the commoner abnormalities of labor.

From the standpoint of leaving the broad ligaments as nearly normal as possible, it is most unwise to subject the patient to a prolonged and ineffectual second stage. As she bears down, the uterus advances with the child. But little better would be the application of forceps to the head and production of its instrumental advance. Each results in stretching of the broad ligaments and in undesirable uterine descent.

The cervix following a careful manual dilation, version, and extraction will be found to be thin and sharp. It would be so thin and its location would be so high in the pelvis that it is with difficulty brought down for inspection. Often the only test of its integrity is the sensation it imparts to the palpating finger.

I believe the broad utility of internal podalic version and breech extraction over protracted second stage and even over skillful forceps in high arrest of the head and incomplete dilation cannot be too strongly stressed.

DR. WM. H. HUMISTON, CLEVELAND, OHIO.—With reference to correcting retroversions, I think it is highly important that the woman should be under close observation following the birth of the child until it is known that the pelvic organs are in a normal condition. I have never failed as yet to secure a complete result by the use of a pessary suitably fitted in a retroversion following confinement, and the sooner that retroversion is discovered the better it can be corrected by the use of a pessary, unless there is slight pelvic inflammation or adhesions that cannot be detected readily. If the pessary does not correct the condition in three or four months I think you may be sure that the results of some former pelvic inflammation exist, giving rise to the adhesions from the posterior uterine wall to the omentum or intestine.

DR. WELTON (closing).—When we diagnose a posterior position the patient is instructed to lie on the side to which the occiput points.

In arriving somewhere with this prenatal problem Public Health officers have taken the matter in their own hands and are directing a propaganda towards educating women. As an example: Dr. Herman Bundensen, Health Commissioner of Chicago, has written a brochure, *Before the Baby Comes*, which covers the entire prenatal field, in language easily understood by any woman. This little book will be sent to the laity. It will educate the public as to what to expect from the physician.

Our part of the responsibility rests in educating the doctor. When we stop treating obstetrics as a stepchild of medicine, we will have advanced a long way towards the obstetric Utopia.

DR. GORDON, (closing).—A word about manual dilation of the perineum: I do not think it protects the patient from a cystocele and I do not think it is needed, and I believe that soap, as commonly used, makes a multitude of abrasions and affords a greater opportunity for the invasion of bacteria than does perineotomy.

In relation to Dr. Potter's remarks, I wish to point out that I stated obstetrics is not surgery in the sense that it is not a surgical specialty any more than surgery is simply doing operations. Obstetrics is a wide and broad field which takes

care of more than simple delivery. I agree that we are bound to prevent pain, but not at too great a price.

As to the Duncan and Schultze methods of separation, I believe there is no difference, for the placenta is separated because there has been sudden diminution in the area of the placental site and the placenta is then thrown off—whether thrown off all at once depends upon the location and the bulging that takes place behind it. I believe there is no such thing as a Duncan or a Schultze method of separation, but that when the placenta is cast off it is subject to the same deflecting influences as is the head, and the character of its expulsion depends upon how it lies in the uterus when thrown from the placental site.

DR. POLAK, (closing).—The discussion of this subject has taken a great deal of time but has brought out what the Council expected it to do, for it will furnish the general practitioner with uniform methods to better his obstetrics.

What I have described is not the old episiotomy. We discarded that years ago as you all did. We are speaking of median incision of the lower structure of the pelvic floor, which relieves the tension on the anterior fascia and allows the levators to recede uninjured. Fascia is stretched by prolonged pressure and every torn muscle tears close to its aponeurotic attachment. Consequently when we get actual injuries to the levators they are torn off near the white line and the fascia is torn off close to the pubic attachment. We hope by median perineotomy, severing the fascial structures in the median line, to allow a recession of the muscles which escape injury.

Median perineotomy is good in all cases where there is sufficient bischial space, but if there is not, the median incision may go into the rectum. In funnel pelves always carry it to one side making an oblique incision of the introitus to allow the rectum to be free. We cannot restore an oblique incision as we can a median incision.

I tried to make out a difference between prophylactic forceps and forceps control. We do not feel that they should be spoken of in the same discussion. Forceps control is a procedure that aids nature's mechanism and by dropping the thighs down flat, which relaxes the pelvic floor and by using forceps control and a perineotomy you will be amazed to see what a small injury has been made; while if you have the patient in the usual lithotomy posture you will be amazed to see how extensive the injury is.

I agree with Dr. Potter that the cervix looks as though it had been "blasted," and that is the reason I believe that the average man cannot tell where it is blasted and unless there is hemorrhage I teach to leave it alone. I agree with him, furthermore, that if we sew it up we get a result that is perfectly surprising in these cases, but it is not for the rank and file to do.

As to acquired retroversion, those cases of congenital retroversion with a short invagination of the anterior lip and a deep one on the posterior lip, cannot be cured by a pessary, nor for that matter by an operation, for most of them recur.

**Monday, September 20, 1926**

*Afternoon Session*

DR. LOUIS E. PHANEUF, Boston, Mass., read a paper on **The Obstetric Future of Women After Cesarean Section**. (For original article see page 446.)

#### DISCUSSION

DR. JAMES A. HARRAR, NEW YORK CITY.—Separation or rupture of the low cervical scar may not be frequent, but it does occur, good authorities to the contrary notwithstanding. I would like to put on record two cases, one that I know of and

one I saw personally. These cases were previous low two-flap cesarean sections. In one when the bladder was dissected down, the head was found directly under the bladder, no uterine wall between; the old cervical scar entirely separated. The second case had a previous low-flap cesarean. It came in as a clean case and I did a classical operation. After removing the child I found the lower end of the uterine incision had torn through into an opening down behind the bladder where the old low cervical scar had entirely separated. I closed the fresh incision in the usual way and, making a bladder flap, brought the bladder up over the lower end of the recent wound, ignoring the old scar which was not a fresh tear, but with healed and separated edges.

DR. JOHN POLAK, BROOKLYN, N. Y.—The essayist has brought out three points. One has been already referred to by Dr. Harrar and I think deserves consideration. Our experience has been entirely in accord with Dr. Phaneuf's; at subsequent sections we have had no difficulty in separating the bladder, and we have not so far found any abdominal adhesions to any of the structures after the low operation.

The point that Dr. Harrar has brought out brings up a very interesting question. I personally believe that the low section should be confined to a woman who has been in labor and who has the lower segment of the uterus thinned out, because otherwise we are cutting through, even in the low operation, the contractile portion of the uterus and I rather believe that if the histories of Dr. Harrar's cases were followed up we would find that they were not cases which were done after the lower segment had been thinned out. Monro-Kerr has demonstrated recently what I believe is the last word in low sections, namely, the transverse uterine incision through the thinned out cervical segment. It is wholly in the dilated portion of the uterus and consequently does not involve the contractile portion. There are several good points about this. First of all, sepsis is minimized by handling through the cervix, because nature has fortified the woman against infection through the cervical tissues as will probably be brought out by Dr. Findley this afternoon.

The second point is that drainage is thoroughly established and retraction of the contractile portion is maintained if that portion is not cut through.

DR. JAMES K. QUIGLEY, ROCHESTER, N. Y.—I would like to emphasize the comparative comfort of these patients. One patient delivered a baby through the smallest pelvis I have ever seen. At her first labor, she had had a low cervical section and made a good recovery. During her second pregnancy she was asked to come to the prenatal clinic ten days before labor, but she failed to do so. She went into labor at home, thirty-five miles away, and when I saw her she had a fully dilated cervix, with the head wedged into the pelvis. She delivered the baby through a pelvis with a true conjugate  $6\frac{1}{2}$  cm. The baby weighed less than five pounds. I do not believe the classical section scar would have withstood that strain.

I have had thirty odd low cervical sections. Five of them I have sectioned the second time in that manner and had no trouble in separating the scar the second time and have found no adhesions.

Dr. Polak's point is well taken for only three days ago in a primipara of forty-three with ruptured membranes, blood pressure of 210, because of her age and toxic condition, I did a low cervical section before the onset of labor, I encountered difficulty because I made the incision through the lower uterine segment which was not very thin.

DR. L. FRAENKEL, BRESLAU, GERMANY (Translated by Dr. Roder).—In the many sections in my service, we have found no rupture of the uterus. The incision is so placed that the contractile fibers of the uterus are not involved. For instance, if the incision were made on the left side, and an additional operation subsequently became necessary, and was performed on the right side, it was almost impossible to

visualize the incision that had been made on the left side. Surgeons performing hysterotomy have almost entirely abandoned the classical operation and have accepted the cervical operation of which Dr. Phaneuf has spoken.

Furthermore, in as much as ruptures can take place through the parting of the fibers, and they do take place in the classical operation, it is the suture technic which is mostly concerned, because in placing the sutures some of the glandular structures can be carried into the muscular tissue, causing weakness of the uterine wall.

DR. PHANEUF (closing).—I might answer Dr. Harrar's discussion by giving a review of 3600 cervical cesarean sections which were published in *Gynecologie et Obstetrique*, by Wetterwald, in February, 1926. As I recall it, Dr. DeLee's, Dr. Polak's and my statistics were included in this series. Wetterwald found that rupture of the scar in successive pelvic deliveries occurred in 25 per cent of the cases after high classical cesarean section, while the literature records only ten ruptures of the cicatrix in 3600 low cervical cesarean sections, or 0.28 per cent. I believe that in the two cases mentioned by Dr. Harrar, it is possible that the incision might have been made too high in the uterus and not entirely in the cervix.

It is essential to place the patient in the Trendelenburg position and to make the incision entirely in the cervix to obtain good results. I realize that my series of 41 repeated operations is small, and yet, as I looked up the recent literature, the largest reported number which I encountered was that of Wetterwald which was 13. There has been but little written on the subject of repeated operations, in connection with the low cervical cesarean section. I presume, that as more of these operations are done we will find a definite incidence of ruptured scars, but I am convinced that a cicatrix in the cervix is less likely to separate than one in the body of the uterus, and that, therefore, it is a safer one. Dr. Polak has emphasized the desirability of placing the uterine incision below the circular fibers.

DR. JAMES AITKIN HARRAR, New York City, read a paper on **Rectal Ether Analgesia in Childbirth; Technic and Results in Six Thousand Cases at the New York Lying-In Hospital.** (For original article see page 486.)

#### DISCUSSION

DR. JOHN OSBORN POLAK, BROOKLYN, N. Y.—I believe with Dr. Harrar, that a woman has a right to analgesia in labor when it can be had so safely as it can with the ether, magnesium sulphate and morphine method. If we are discouraged with the first results, we should nevertheless keep on with this method, because the failure with some of our first results was due to defects in our technic. One thing that ether does more than other drugs we have tried, is that it obliterates the cervix, and the one point that we as obstetricians want to get over to practitioners is that the first stage of labor is a physiologic process and anything that will relieve the pain, conserve the energies of the patient and accomplish dilatation of the cervix is something to be accepted and that is what we have in ether analgesia.

DR. GRANDISON ROYSTON, St. Louis, Mo.—The work of Dr. Schwarz and Dr. Jackson in St. Louis with the morphine-hyoscine analgesia, showed that the ill effects on the child depended solely upon the amount of morphine used, usually a sixth of a grain, and if given within less than four hours preceding the birth of the child the effect was more marked. It was also stated that it retarded the result of labor. We found that the average duration of labor was one-half hour longer where morphine-hyoscine was used than when it was not used.

DR. PAUL TITUS, PITTSBURGH, PA.—I have been using this method for over two years and am most enthusiastic about it. I have yet to see any serious ill effects.



One thing we have noticed, that may possibly be attributed to the rectal analgesia, especially when given shortly before the birth of the child, is that these babies seem to have considerable mucus in their throats. That is, however, a trifling obstacle. Reasoning that this might be due to the irritating effect of the ether my associate, Dr. Paul Dodds, suggested that we add atropine to the preliminary hypodermic of morphine in magnesium sulphate. We think this has had a beneficial effect, although as yet we cannot say positively.

One thing which should be considered from an economical standpoint is that this method does away with considerable expense in so far as the cost of oxygen and nitrous oxide is concerned. We still use nitrous oxide analgesia where the rectal analgesia does not carry the patient completely through, practically always ending the labor with complete ether anesthesia, but the amount of such anesthetics necessary has been greatly reduced, and the patient's pain and discomfort are distinctly lessened by this new method.

DR. ARTHUR H. BILL, CLEVELAND, OHIO.—It should be recognized that rectal analgesia is very useful and has a distinct place, but I do not believe that it will supplant morphine and scopolamine or general anesthesia, although it may curtail their use. We all realize the limitations of morphine-scopolamine. We have used that method a great deal in our service but have limited its use almost entirely to primiparae. The reason for this is that we have very carefully followed the safety rule of stopping the administration of both of these drugs, preferably four hours, before the expected time of delivery. This to a very large extent rules out its use in the cases of multiparae. The relief of pain in primiparae is somewhat greater than can be obtained by rectal ether. For instance, we do not have any rule in regard to the primary administration except the suffering of the patient. Dilatation means nothing. We follow the rule that if the patient has pains and needs relief she is given relief. The method does not require two or three fingers' dilatation.

I believe the main field of usefulness for rectal analgesia will lie in multiparae and where a general anesthetic is contraindicated. Primiparae have easier labors than multiparae in my experience. A primipara will go through a labor and know nothing from start to finish.

DR. HARRAR (closing).—We no longer use the twilight sleep at the Lying-In Hospital. We used it in three or four hundred cases, but gradually abandoned it because the patient would not have good bearing down pains and after the head was on the perineum, there it stayed. We had no more stillbirths but we had more alarms about the baby at birth. The baby would move its arms and legs perhaps and then lie there and blink but would not breathe. We knew if we did get stillbirths after using scopolamine no one outside of ourselves would excuse us. There is no question that a single dose of scopolamine and morphine given early in labor is of great value, but to develop the real twilight sleep through to the end is somewhat dangerous to the baby.

As for irritation of the colon, occasionally there is diarrhea for twenty-four hours. If the woman has an unrecognized fissure she will have a little burning pain for a few minutes after the instillation. With a fistula, or ischiorectal abscess or extensive hemorrhoids the method would not be employed.

We believe in introducing the instillation warm because it acts more quickly. The rate of evaporation depends among other things on the temperature of the mixture. The ether begins to evaporate at once, the ether separating from the oil, reduces the temperature of the colon. As soon as the temperature of the mixture falls, the evaporation is slower and so a constant plane of evaporation and absorption is maintained.

The only obstetric contraindication to the use of this method is uterine inertia. Of course, if you give morphine in any case you may stop labor. If so, simply wait

until labor starts again and begin the whole cycle over again. I repeat the caution not to use the morphine or the rectal instillation of ether too soon.

As to the danger of morphine to the baby, we believe that is rather overestimated. I am firmly convinced with my experience in twilight sleep that it was the scopolamine and not the morphine that caused the trouble with the baby. If we give a quarter grain of morphine before we do a cesarean section under local anesthesia the baby is born all right. In our large doses of morphine in the treatment of eclampsia, the patient may have as much as two grains in the eight or ten hours before delivery, and if the baby is born living we rarely have difficulty with resuscitation.

As to the baby, we must warn the anesthetist not to use much inhalation ether at the moment of birth. If too much is given the baby may be born somewhat anesthetized.

The result will be better if you have two finger tips' dilatation, and in a primipara preferably three finger tips'. In many of our cases we give a second and sometimes a third rectal instillation, cutting the quinine down to ten grains in the subsequent instillations.

As to the danger of the morphine to the baby being increased by the synergistic action of the magnesium sulphate, apparently the toxic effect is not prolonged but merely the analgesic effect. We used to give quinine with castor oil to start labor and our experience in giving it this way showed that it has definitely an oxytoxic effect. We omitted the quinine from the formula in thirty cases and had to do more low forceps. This method is so simple and so safe that we desire to recommend it for extended use in hospital and in home confinements. The only contraindication is uterine inertia. There are two difficulties the beginner will have; the proper retention of the enema, and the giving of it too soon and so slowing down the labor. Be sure the woman is suffering before you begin to relieve her pain.

DR. JAMES W. KENNEDY, Philadelphia, Pa., read a paper on **Vaginal Hysterectomy and Its Indications**. (For original article see page 506.)

#### DISCUSSION

DR. CHAS. L. BONIFIELD, CINCINNATI, OHIO.—In the first part of the paper the doctor said that many patients do not come to us at the right time, that they go out after strange gods, until it is too late to give surgery the chance to which it is entitled. I think the medical profession is much to blame for this state of affairs. One of the main causes is that hospital care has become so expensive and surgeons have become so mercenary that a man of moderate means regards it as a luxury he cannot afford, and tries other means of cure until in desperation he is driven to the hospital and surgery. The medical profession, I very much fear, has become commercialized, and until we get back to our traditions and put service before remuneration, we cannot expect to have the confidence of the laity that the self-sacrificing old family doctor at one time commanded.

Vaginal hysterectomy came into vogue and for some years was the operation of choice by the great majority of operators, but it has gradually passed from popularity almost to desuetude. There must be some reason for this. There can be no argument that there is less shock following vaginal hysterectomy than there is following abdominal hysterectomy, and it is true that clamps put on the broad ligaments and left there furnish good drainage; but no one can convince me that the pelvis can be cleaned out as thoroughly through the vagina, as through the opened abdomen.

It has been my experience, and I believe that of most operators, that one cannot always tell which patients with cancer of the uterus are going to do well after they

have recovered from the operation. We sometimes get good results when we least expect them.

DR. THOS. B. NOBLE, INDIANAPOLIS, IND.—I do not think there is any debate between vaginal hysterectomy and abdominal hysterectomy any more than there is between cholecystostomy and cholecystectomy. A vaginal hysterectomy should be done when it is indicated. The pathology, the anatomic character of the organs, and the condition of the patient, are the things to be considered. When it can be performed I would always choose a vaginal hysterectomy over the abdominal route for the reason that I believe it is primarily safer; and secondly for the reason that you are not so liable to have postoperative morbidity.

I used clamps for a while when I began the work but I have long since given them up and I feel just as safe in doing a vaginal hysterectomy, depending upon suture, as I do with clamps.

DR. JAMES N. WEST, NEW YORK CITY.—There are several points that the reader brought out in his paper with regard to vaginal hysterectomy that are at variance with my experience and my teaching at the Post-Graduate Hospital in New York. With regard to amputation of the cervix, I consider this one of the most valuable procedures we have for the prevention of cancer. A number of years ago I found on investigation that cancer developed six times as frequently in lacerated as in unlacerated cervixes. I also found that cancer of the cervix developed about six times as frequently as cancer of the body of the uterus.

Then it occurred to me that if by any means we might convert a lacerated cervix again into a healthy organ we might prevent five out of six of our cases of cancer of the cervix, cancer of the cervix developing perhaps on account of the chronic irritation produced through laceration. Undoubtedly that is one of the proofs that cancer is due to chronic irritation. The amputation which I perform is the Emmet method which gives a smooth cervix. I have repeatedly had patients confined after this amputation of the cervix. About one-third of an inch below the internal os should be left. If amputated too high these patients cannot carry a child. After three months there being no circular fibers they would abort.

In regard to vaginal hysterectomy for malignant growth of the body of the uterus, I cannot agree with the reader because when we do an intraabdominal operation, the line of dissection is well out toward the side of the pelvis. We do not necessarily have to expose the ureters or to incur the great primary danger that exists in the complete operation of Wertheim.

In regard to the use of vaginal hysterectomy for complete procidentia, I have been able to cure the most extensive case of longstanding by means of the interposition operation and the plastic work on the posterior vaginal wall and the perineum.

DR. MAURICE I. ROSENTHAL, FORT WAYNE, INDIANA.—As to sudden deaths after hysterectomy for fibroid: There must be a definite pathology back of these sudden deaths and myocarditis is not the answer. These patients do not die from shock or the immediate effects of the operation. They die four, six, nine days or later.

I have had such an experience several times. Now, why do these cases have a tendency to develop embolism? It occurred to me that injury to the intima of the pelvic veins during the course of the operation might account for the formation of the emboli. In abdominal hysterectomy for fibroid tumor the ordinary procedure is to slip in a corkscrew or grasp the tumor with other instruments and deliver the tumor from its position, sometimes deep in the pelvis, into the abdominal wound, placing the broad ligaments to such a degree of tension as to cause injury to the inner lining of the veins.

Having come to this conclusion, I make it a practice to divide the broad ligaments before delivering the tumor into the wound. I believe it is because of this change in

technic that I have had no case of pulmonary embolism following abdominal hysterectomy for fibroid tumor.

DR. RUFUS B. HALL, CINCINNATI, OHIO.—I do not agree with the essayist about total extirpation for procidentia. If you take the uterine out, you may not have a recurrence of the cystocele afterward, but those cases in which you do,—and they are not a few,—will give you more trouble, and are really worse than before your operation. You cannot repair that patient and make her comfortable with any operation; therefore, I abandoned total extirpation for procidentia years and years ago. The most satisfactory operation I have found for procidentia, is transposition of the uterus and repair of the perineum. So far I have not had a recurrence of a cystocele or rectocele or other complications.

DR. WALTER T. DANNREUTHER, NEW YORK CITY.—Many years ago Baldy, of Philadelphia, published some statistics on sudden death following gynecologic operations, consisting of a series of 3,413 cases, 366 of which were hysterectomies for fibroids. In this series of more than 3,000 cases there were sixteen of these sudden postoperative deaths. Thirteen of them occurred in the 366 cases of hysterectomy for fibroid, and three after the 3,047 operations for other conditions. In the last two cases of sudden postoperative death in my own practice, I was fortunate in getting autopsies. We discovered in each instance that the antemortem diagnosis of pulmonary embolism was correct, and further dissection showed the primary clot to be in the femoral vein in both patients.

I have recently had the opportunity of disussing the Wertheim operation personally with Weibel, of Vienna, Warnekros, of Dresden, and Bonney, of London, each of whom has done hundreds of these extensive hysterectomies. They were unanimous in the contention that their operative mortality was only 6 to 8 per cent, despite the fact that they refused to operate on comparatively few cases of carcinoma of the cervix. At first I thought that the extremely low mortality could be explained by the universal use of spinal anesthesia and the unusual technical skill of these surgeons. I soon appreciated, however, that all three emphatically stressed the desirability of leaving the vagina wide open in all complete hysterectomies, packing iodoform gauze laterally above the vaginal stump, and filling the vaginal canal with it. This procedure restricts capillary oozing and the accumulation of blood in the pelvis, both of which are potential sources of postoperative morbidity. Most immediate deaths after wide abdominal hysterectomy are due to pelvic sepsis or shock. In listening to Dr. Kennedy's paper, it struck me that his unusually low mortality after vaginal hysterectomy may probably be attributed largely to the fact that he leaves the vagina open much the same way that the continental operators do after abdominal hysterectomy.

*(To be continued.)*

The distressing news has just reached us that DR. JOHN GOODRICH CLARK, a member of the Advisory Editorial Board of this Journal since its foundation, died in Philadelphia, on May 4, 1927. An appropriate memorial of his valuable services to American gynecology will appear in the June issue.

# Department of Reviews and Abstracts

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CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

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## Collective Review

### THE OBSTETRIC LITERATURE OF 1926

BY J. P. GREENHILL, B.S., M.D., F.A.C.S., CHICAGO, ILLINOIS

(Attending Obstetrician, Chicago Lying-In Hospital and Dispensary; Attending Gynecologist, Cook County Hospital; Associate in Obstetrics, Northwestern University Medical School)

AS IN preceding years an attempt has been made to review briefly the most important articles which have appeared in the American, British, French, German, Austrian and Scandinavian journals. Because of limited space and the large number of articles, only the chief points are stated and the reviewer's comments necessarily are few and short.

The interesting features of this year's literature in the order in which they are discussed, are as follows: A continuation of the controversy regarding the treatment of febrile abortions, and the same lack of unanimity concerning the therapy of eclampsia with, however, a decided increase in the number of those who feel eclampsia should be treated along medical and not surgical lines. Local anesthesia both for therapeutic abortion and cesarean section is gaining favor. The furor of operative obstetrics is being condemned but the value of episiotomy and properly indicated and carefully performed low forceps operations is being recognized. The low or cervical type of cesarean section is gaining advocates rapidly and its superiority is being recognized in such additional foreign countries as France and Holland. This operation is being especially recommended for the treatment of placenta previa. More attention is being paid to patients after delivery and special emphasis is laid upon examinations of the cervix during postpartum visits. The questions of maternal welfare, the obstetric curriculum of medical students and the education not only of doctors but also of the lay public are considered by special committees which are doing splendid work.

#### PREGNANCY

*Physiology.*—From a study of 609 blood pressure observations and 675 urinalyses, Faught<sup>12</sup> concludes that the mere elevation of systolic blood pressure does not indicate the approach of grave complications unless constant and that the persistent occurrence of albumin or other urinary abnormalities usually has little significance. These conclusions

<sup>12</sup>References will be published at the end of the article in the June issue.

should not go unchallenged because a fair number of patients who have an elevated systolic blood pressure with or without albuminuria and a certain proportion of women with urinary abnormalities alone, develop outspoken symptoms of toxemia. Stieglitz<sup>2</sup> discusses hypertension during pregnancy and emphasizes that it is a symptom only. Kerwin<sup>3</sup> points out that extreme obesity is pathologic in pregnancy as well as in the nonpregnant state and should be controlled through diet and exercise. Pendleton<sup>4</sup> studied the contour abdominal measurements of a large number of pregnant women with a view of estimating the probable date of labor and found his method to be as accurate as Naegele's rule after the twenty-fourth week. Falls<sup>5</sup> devised a stethoscope that can be applied through the vagina. This advances the time of hearing the fetal heart tones about four weeks and is of value in patients with thick abdominal walls, in cases of fetal death early in pregnancy, in cases of pregnancy associated with fibroids and in some cases of placenta previa.

Findley<sup>6</sup> collected 132 cases of uterus didelphys from the literature and added 3 of his own. A study of these revealed that this abnormality is usually compatible with normal sex life and that unusual fertility is demonstrated in many cases. Abortions are common and labor is prolonged as a result of poor muscular development in the uterus, small rigid cervix and the encroaching nonpregnant uterus. Spontaneous delivery is, however, the rule.

The normal and pathologic physiology of pregnancy is discussed by Ehrenfest<sup>7</sup> who emphasizes that the widespread and varying morphologic, chemical and functional alterations which characterize the normal physiology of pregnancy, express the gradual adaptation to exigencies created by pregnancy. These requirements consist chiefly in the needs of the fetus for building materials and energy and for disposal of end-products of fetal metabolism. Later in pregnancy, adjustment is required to certain derangements within the abdominal cavity caused by the enlarging uterine tumor. In the constitutionally normal and healthy woman this adaptation will be fully achieved but in the woman who is constitutionally deficient, or in whom certain organs have become unable to respond with an increase of function to an increase in demands, adjustment is likely to be accomplished only slowly or imperfectly. Inadequate adjustment manifests itself in signs and symptoms which constitute the pathologic physiology of pregnancy best revealed in the toxemias of pregnancy.

A study of the base of the broad ligament and outer layers of the uterine wall by Hofbauer<sup>8</sup> demonstrated that during pregnancy a phagocytic tissue makes its appearance in the base of the broad ligament and is intensified under the stress of prolonged labor but especially by the existence of infection. The presence of this phagocytic tissue must be regarded as a protection against infection. It affords a mechanism for the development of local immunity in a region abundantly predisposed to infection and must be of service in doing away with debris and bacteria. These findings explain in part the superiority of the cervical cesarean section over the classic. According to Schwartzkopf,<sup>9</sup> daily vaginal douches of 0.5 per cent lactic acid for a few weeks before labor favorably influence the vaginal flora and diminish the incidence of fever during the puerperium. The reviewer believes such douches are unnecessary as a routine but they may help where there is a profuse vag-

inal discharge or where there is blood in the vagina due to placenta previa while a patient is kept in a hospital under observation.

Arzt<sup>10</sup> found that the free hydrochloric acid and total acid of the stomach are lower in pregnancy than in the nonpregnant and that this deficiency is more marked in the early months at the time nausea and vomiting are most common. He advises that patients take 10-15 drops of dilute HCl by mouth to prevent nausea and vomiting.

*Abortion.*—In a series of six papers, Vignes<sup>11</sup> very thoroughly discusses the question of abortions from many angles. He very properly devotes a number of pages to afflictions of the fetus itself and of the membranes as causes of abortion and calls attention again to abnormal germ plasm as a conceivable etiologic agent. A few years ago, a careful histologic study of a case of missed abortion, in which the fetus, placenta, implantation site and uterus were examined, led Greenhill<sup>12</sup> to the conclusion that defective germ plasm was the most likely cause of death of the fetus in this case. J. Novak<sup>13</sup> treated 4 cases of habitual death of the fetus with good results by the administration of potassium iodid and iron. The reviewer has found this combination of drugs very useful especially with the addition of a little mercury and arsenic. Among 113 women operated upon during pregnancy, Brindeau and Juge<sup>14</sup> report 13 interruptions of pregnancy (11.5 per cent) and three deaths (2.55 per cent). Varo<sup>15</sup> reports 30 ovariectomies performed during pregnancy followed by three miscarriages. The author advises that the operations be performed at a time which would correspond to the intermenstrual period were the patient not pregnant. Among 43,761 cases of pregnancy, v. Büben<sup>16</sup> found 155 complicated by tumors of the genitalia. The most frequent tumors were myomas, then adnexal growths and least of all, malignant tumors. Most of the patients with myomas (88) delivered their babies spontaneously without any complications. Among the 53 patients with adnexal tumors, of which 44 were ovarian cysts, 44 were operated upon during pregnancy. Royston and Fisher<sup>17</sup> report ten cases of appendicitis during pregnancy, four of which were acute, and these illustrate the necessity of immediate operation in the acute cases.

A study of 610 cases of abortion leads Clauser<sup>18</sup> to advise immediate emptying of the uterus in febrile abortions except in cases of acute peritonitis and general sepsis. Kottlors<sup>19</sup> studied 573 cases of abortion and came to the same conclusion. Schwarz<sup>20</sup> advises the introduction of a dry or alcohol-saturated thin piece of gauze into the uterus for purposes of drainage. On the other hand, Kessler<sup>21</sup> claims good results with expectant treatment and the use of quinine. Gantt<sup>22</sup> writing on the medical conditions in Soviet Russia, mentions that the law requires that practically anyone applying for an abortion can have it done but it must be done by a licensed physician in a public hospital. During the last 15 years of practice in Russia, Weisenberg<sup>23</sup> has observed eight cases where in spite of the fact that the uterus was invaded with the purpose of interrupting pregnancy, the latter continued. Schneider<sup>24</sup> reports two fatal cases of tetanus which followed criminal abortion.

In all likelihood, the best results in cases of febrile abortion are obtained by conservative therapy. As in the treatment of puerperal infection after full-term labor, the essential thing is to build up the patient's resistance with fresh air, sunlight, or quartz and other lamps, nourishing food, tonics, occasionally blood transfusion, etc. Where there

is much bleeding in cases of abortion, the uterus may be packed with iodoform gauze. The uterus can usually be emptied by the administration of quinine by mouth and pituitary preparations hypodermically. Elevation of the head of the bed will favor drainage of the uterus. When pus is present one must resort to surgical measures.

*Complications.*—A study of 84 pregnant women with pulmonary tuberculosis, led Bridgman and Norwood<sup>25</sup> to believe that when a pregnant woman has active pulmonary tuberculosis, the latter should be treated to the uttermost and the pregnancy disregarded. Artificial termination of pregnancy is not indicated and in the series studied, led to a worse outcome. The excitement, the etherization and the shock of the operation are additional factors which curtail the patient's strength. Many writers like Pankow,<sup>26</sup> however, feel that when active pulmonary tuberculosis is found during the first few months of pregnancy, the latter should be interrupted because the pulmonary condition is usually aggravated by pregnancy. One may empty the uterus easily under local anesthesia aided by morphin. Couvelaire<sup>27</sup> describes a special arrangement at the Baudeloque clinic for the care of pregnant women who have pulmonary tuberculosis and for the children of these mothers.

In a very thorough way Belding<sup>28</sup> discusses the effect of treatment of the syphilitic pregnant woman upon the incidence of congenital syphilis. In 150 women with positive Wassermanns, who received no treatment during pregnancy, 61.3 per cent of the conceptions resulted in living, apparently nonsyphilitic children. However, in the 87 who in addition showed evidence of clinical syphilis, the incidence was only 42.4 per cent, whereas in the 63 without clinical evidence, the incidence was 87.4 per cent. A group of 40 women received antisyphilitic treatment during pregnancy and living, apparently nonsyphilitic children resulted in 67.5 per cent of the conceptions. Had these patients been more intensively treated, the latter figure might have been higher. According to Buselike and Gumpert,<sup>29</sup> the number of apparently healthy children born of syphilitic mothers varies between 15 and 30 per cent. Antenatal treatment increases this incidence but postnatal treatment of luetic children does not give very favorable results. For eugenic reasons, when it has been shown that families have degenerated children, the authors advise abortion. It will be hard to convince most people that syphilis is an indication for abortion because intensive treatment of the mother before and during pregnancy, will in the large majority of cases, result in healthy babies.

A study by C. Davis<sup>30</sup> indicates that if a woman with a normal thyroid has sufficient iodine during a normal pregnancy, her basal metabolic rate will remain within normal limits. Metabolic rates that are well above normal limits are believed to indicate abnormal function of the thyroid. There is usually a return to normal limits within eleven days postpartum, but these patients should be kept under observation for a long time after delivery. Minsey, Plummer and Boothby<sup>31</sup> studied all the women whose pregnancy was complicated by exophthalmic or adenomatous goiter with hyperthyroidism who were examined at the Mayo Clinic during the last ten years. They found that the association of pregnancy and these conditions was rare and that serious complications were not more frequent than is usual with either condition alone. Therapeutic abortion was not necessary.



As proof of the incompatibility of pregnancy and fibroids of the uterus, Mosher<sup>32</sup> mentions the frequency of sterility associated with fibroids, the tendency to abortion and premature labor in these patients and the stormy experience which these patients endure due to obstruction, pain, hemorrhage and sepsis. The author discusses the treatment of fibroids during pregnancy and labor.

Ziskin<sup>33</sup> examined the teeth of a large number of pregnant women and found that pregnancy per se cannot be given as a cause of caries. He found an increased frequency of caries with an increase in age but the number of pregnancies did not influence the frequency of caries. S. Monash<sup>34</sup> observed six cases of proliferative gingivitis during pregnancy and denies that there is any kind of gingivitis peculiar to and found only in pregnancy.

*The Toxemias.*—It is Talbot's<sup>35</sup> opinion that toxemia of pregnancy is always associated with foci of chronic infection and several clinical characteristics of the disease suggest its infectious origin. Treatment by the removal of foci of chronic infection in the presence of a toxemia is dangerous but the removal of all foci of chronic infection either before or between pregnancies gives good results. Carter<sup>36</sup> believes that hyperemesis occurs when the ovaries fail to produce a hormone and he therefore treats pernicious vomiting by giving ovarian extract. Harding and Van Wyck<sup>37</sup> again stress the use of fluids in hyperemesis gravidarum. They feel that glucose, though important, is secondary to fluids and they advise against the use of insulin. On the other hand, King<sup>38</sup> and also Levy<sup>39</sup> advocate the use of glucose with insulin in these cases.

There is no doubt that the most essential thing in the treatment of pernicious vomiting is the administration and absorption of fluids; but glucose is also important. The duodenal or the nasal tube is of great assistance because one may give with it not only fluids and carbohydrates but also fats, proteins, sedative drugs, fruit juices and laxatives. One should however, not forget to treat the psyche as well and to search for focal infections and local causes.

Bell<sup>40</sup> studied the postmortem findings in 10 cases of toxemia and his data do not support the belief that any one lesion of the liver is essential for the toxemia of pregnancy.

Stander and Peckham<sup>41</sup> suggest the following classification for the late toxemias of pregnancy: (1) eclampsia, (2) preeclampsia, (3) chronic nephritis complicating pregnancy, (4) eclampsia superimposed upon nephritis, and (5) low reserve kidney. An intelligent differential diagnosis can often not be made until the end of the third week of the puerperium.

Lash<sup>42</sup> found that the disappearance time of intradermally injected salt solution in patients with toxemia of pregnancy is definitely decreased especially in patients with convulsions. The disappearance time increases with the increase in general improvement. Stander and Peckham<sup>43</sup> found the basal metabolism to be slightly higher in preeclampsia than in normal pregnancy and still higher in the cases of nephritic toxemia. The basal metabolic curve for eclamptic patients is almost identical with the nephritic curve; hence basal metabolism determinations do not help to differentiate between the types of toxemia in late pregnancy. According to Stander and Radelet<sup>44</sup> the outstanding chemical findings in the blood of eclamptic patients are a high uric acid, a markedly increased lactic acid, a decrease in the CO<sub>2</sub> combining power

and a definite tendency towards a hyperglycemia which is often associated with a high inorganic phosphorus. The same authors<sup>45</sup> also found an increase in lactic acid in cases of low reserve kidney and nephritis complicating pregnancy. Levy<sup>46</sup> examined the blood of 50 preeclamptic and eclamptic patients and found a marked decrease in the blood sugar content, a lowering of the CO<sub>2</sub> combining power and practically no change in the nitrogenous constituents. Feinberg and Lash<sup>47</sup> studied the blood calcium in eclampsia and found no appreciable relationship between the blood calcium and eclampsia.

We again find that blood chemistry studies are contradictory and as yet of little practical value. Stander and Radelet found a tendency toward hyperglycemia and a high uric acid content, while Levy found a hypoglycemia and practically no change in the nitrogenous elements. The older methods of examination, urinalysis, blood pressure readings and ophthalmoscopy, still give us the best information for the clinical management of the toxemias of pregnancy.

After acute histamine poisoning in pregnant guinea pigs, a number of phenomena were observed by Hofbauer<sup>48</sup> which are highly suggestive of abruptio placentae as it occurs in women. In carnivora under similar conditions, histologic changes were produced which are suggestive of those found in women who died of eclampsia. The striking similarity regarding blood chemistry in eclampsia and acute histamine intoxication is emphasized and local anesthesia is suggested in operations for abruptio placentae and for eclampsia.

According to Harding and Van Wyck<sup>49</sup> there is only one pertinent dietetic factor in the treatment of preeclampsia and that is the presence or absence of salt. Protein or fat even in excess, produce no ill effects. The authors suggest the inclusion of one salt-free week in four as a prophylactic measure against preeclampsia.

At the last meeting of the American Medical Association there was a symposium on the toxemias of pregnancy. Polak<sup>50</sup> reviewed the present status of the question. He emphasized that prevention was the keynote of success, that toxic patients need active treatment with the first appearance of hypertension, that convulsions may be prevented by induction of labor when medical means fail to reduce tension and to produce diuresis, that the treatment of eclampsia is essentially medical, and that surgical delivery has only a limited field. Greenhill<sup>51</sup> reviewed the cases of eclampsia seen at the Chicago Lying-in Hospital. The treatment was essentially directed toward emptying the uterus. The gross maternal mortality was 7.7 per cent and the gross fetal mortality 27.7 per cent. The author feels that the treatment of antepartum or intrapartum eclampsia should not be entirely conservative nor entirely radical. However, in experienced hands he favors emptying the uterus in most cases and the method selected depends upon the condition of the patient, the size of the baby and the state of the cervix. Where the patient is a primipara with a viable baby and the cervix is undilated, he prefers to terminate pregnancy by a low or cervical cesarean section under local anesthesia as soon after the first convulsion as possible. All eclamptic patients should be sent to a hospital. When a patient must remain at home, the treatment should be conservative. It should also be conservative in a hospital when the attending physician is not skilled in operative obstetrics. Davis and Harrar<sup>52</sup> analyzed the cases of eclampsia which occurred at the New York Lying-in Hospital and

they believe that the eclamptic patient is as much a medical as an obstetric problem, and that obstetric intervention should be for obstetric indications only and not for convulsions. The gross maternal mortality was 23 per cent; but since 1918 the patients have been treated conservatively and the gross maternal mortality was reduced to 15 per cent and the fetal mortality to 34 per cent. McNeile and Vruwink<sup>53</sup> closed the symposium and advocated the intravenous use of magnesium sulphate for toxemia. Since using this drug, their mortality for eclampsia has been reduced from 36 per cent to 14.8 per cent but the greatest enthusiasm centers about the reduction in morbidity in preeclamptic cases.

Lazard, Irwin and Vruwink<sup>54</sup> report 142 cases of toxemia treated by the intravenous use of magnesium sulphate. The gross maternal mortality among the 103 eclamptic cases was 13.6 per cent. Dorsett<sup>55</sup> recommends that magnesium sulphate be given intramuscularly and in his series of 38 cases there were only two deaths. Stroganoff<sup>56</sup> reports a series of 300 eclamptic patients treated by his entirely conservative method with a maternal mortality of 2.6 per cent and a fetal mortality of 16.6 per cent. He mentions that among 3302 cases reported in the literature as having been treated by his method, the maternal mortality was 10.8 per cent. Kosmak<sup>57</sup> favors conservative practice coupled with preventive measures in the treatment of toxemias. McMahon<sup>58</sup> obtained good results by injecting into the veins of eclamptic patients, blood serum from recovered eclamptic women. C. J. Miller<sup>59</sup> and also Levy<sup>60</sup> recommend the use of glucose and insulin in addition to a modification of the Stroganoff treatment.

The status of insulin in the treatment of the toxemias of pregnancy is by no means settled. A few, like Thalheimer,<sup>61</sup> Stander and Duncan,<sup>62</sup> and C. J. Miller<sup>59</sup> claim that insulin is a great aid, while others, like Titus,<sup>63</sup> and Harding<sup>37</sup> condemn insulin and believe that it can sometimes cause harm. The reviewer has not seen any real benefit from the use of insulin in the treatment of the toxemias; and since insulin can do harm, it should be used with great caution and must be controlled by proper laboratory and clinical studies. Magnesium sulphate, however, has proved to be a very valuable drug in the treatment of both eclampsia and preeclampsia.

For the treatment of the edema of the toxemias of pregnancy, Mussey<sup>64</sup> recommends ammonium chlorid because of its diuretic effect. In most cases the improvement was greater and more lasting than that obtained by dietary and other methods. Rockwood, Mussey and Keith<sup>65</sup> studied 100 cases of renal damage occurring during pregnancy and they conclude that many of the toxemias of pregnancy are associated with nephritis and can be classified as are other types of nephritis not necessarily occurring during pregnancy.

#### LABOR

*General.*—A new delivery bed which has many advantages is described by Gellhorn.<sup>66</sup> Parabiologic experiments were performed by Kross<sup>67</sup> on pregnant rats and he concludes that fascinating as is the theory of labor as an anaphylactic phenomenon, in his rats during labor, no labor-inducing substances were produced that had any appreciable influence on the course of pregnancy in the partner of a parabiologic pregnant pair.

DeLee<sup>68</sup> discusses the principles of the technic of the second stage

of labor and emphasizes particularly protection of the parturient from infection, the prevention of injury, the relief of excessive pain, the preservation of the life and health of the child and the prevention of complications. It is the belief of Hoehne<sup>69</sup> that bearing-down efforts on the part of the woman in labor are due in great part to the elongation of the lower uterine segment and anchoring of the uterus by the round and uterosacral ligaments. The woman in labor attempts to prevent further elongation of these tissues. Gardner<sup>70</sup> considers the ischial-ramie diameter an important diameter. He believes that the most frequent left lateral cervical tear is due to a disproportion between the fetal head and the left ischialramie diameter, and to prevent this tearing it is necessary to wait for full cervical dilatation before interfering. Lankford<sup>71</sup> studied the matter of preparation of the external genitalia for delivery and concludes that either the iodine-alcohol or the 4 per cent mercurchrome method of preparation is safer than any yet advanced.

The question of the protection of the perineum interested Villarama<sup>72</sup> who believes that strong pressure against the advancing head is a disadvantage. The important point is merely to support the perineum in such a way that the distention of the perineum becomes more evenly distributed. The author believes that low forceps offers the best means of delivery for a primipara. For the protection of the pelvic floor, Paramore<sup>73</sup> cautions against undue straining by the patient. He advises that we prevent excessive extension of the head and give an anesthetic. N. H. Williams<sup>74</sup> studied the cervix after labor and found lacerations in 80 per cent of primiparas. He advises repair of these lacerations on the ninth day after labor. Farrar<sup>75</sup> emphasizes that repeated traumatization of the cervix by labor or miscarriage might be a factor in changes terminating in carcinoma. She advises immediate repair of cervical lacerations where possible. The reviewer agrees with Farrar that cervical lacerations should be repaired immediately after expulsion of the placenta and not during the puerperium or still later. McCormick<sup>76</sup> very timely discusses outlet pelvimetry in detail. Unfortunately, very few physicians, including obstetricians, pay much attention to the measurements of the outlet in spite of the great frequency of outlet contractions in American white women.

Jaroshka<sup>77</sup> who studied the course of the first labor in advanced age, believes that it does not matter whether a patient is old or not at the time of the first labor. The bad prognosis of advanced age is due essentially to underdevelopment of the genitalia. The hypoplasia prevents early conception and after conception it causes dystocia. Lundh<sup>78</sup> interested himself in the same problem, and in contradistinction to Jaroshka, found an increase in the toxemias among the older primiparas. The increased duration of labor with increase in age is explained on the basis of a disuse atrophy of the soft parts. Hinselmann<sup>79</sup> examined the vagina of patients during the puerperium to see the damage labor had produced and he found nearly all the injuries in the cervix and in the introitus. A frequent finding was injury to the vestibule due most likely to the strong pressure of the fetal head as it passed through the outlet. Henkel<sup>80</sup> advocates shortening of the second stage of labor by median, deep episiotomy to prevent prolapse of the uterus. Smith<sup>81</sup> discusses the obstetric heresies practiced at the Brooklyn Hospital and advocates manual intrauterine rotation of the fetus in cases of occiput posterior. He likewise believes in incising the perineum and applying

forceps for the purpose of control after the head appears at the vulva and it is likely the patient can deliver herself spontaneously. The reviewer agrees with Smith, Henkel, Hinselmann, Villarama and many others that in primiparas with full-term babies it is advisable for the experienced physician to perform an episiotomy and apply forceps when the head is on the perineum and the occiput is anterior. For the general practitioner whose obstetric knowledge is limited, and this includes the large number of doctors who deliver the majority of women, a policy of watchful expectancy must always remain the rule.

Unterberger<sup>82</sup> reports the first ease of pregnancy following tubal implantation in Europe. The pregnancy was uncomplicated and labor was terminated by a low forceps operation. In America, Watkins and Cullen (and Shaw) have reported such cases. Douglass<sup>83</sup> reports a pregnancy after bilateral salpingectomy.

*Analgesia and Anesthesia.*—Labor was made painless by the Gwathmey synergistic method in 95 per cent of the cases studied by Vogt.<sup>84</sup> The artificial termination of pregnancy in the early months under paracervical anesthesia is extolled by Gellert<sup>85</sup> and Schneider<sup>86</sup> and the use of ethylene in obstetrics is praised by Kreiselman and Kane,<sup>87</sup> and by Plass and Swanson.<sup>88</sup> Although some obstetricians contend that ethylene causes more bleeding than other anesthetics, Plass and Swanson maintain that ethylene has no effect on postpartum hemorrhage but the addition of ether increases the incidence of hemorrhage. From experimental studies, Stander<sup>89</sup> concludes that ether, chloroform, nitrous oxide and ethylene produce changes in the blood, liver and kidneys which are very similar to those seen in eclampsia; hence the use of these general anesthetics for eclamptic patients seems open to objection. The author questions whether prompt delivery under spinal anesthesia may not give better results in the severe cases of eclampsia. An affirmative answer to this may be found by Greenhill's paper mentioned under the discussion on the toxemias and also in DeLee's<sup>90</sup> paper on local anesthesia written two years ago in which he insisted that local anesthesia is the anesthetic of choice in eclampsia and threatened eclampsia. Friedmann,<sup>91</sup> from an experience of 100 cases, claims that lumbar anesthesia is the best method for cesarean section.

*Complications.*—Rupture of the uterus during pregnancy is discussed by Riddell<sup>92</sup> and two cases of rupture following pituitrin are reported by Sherrill.<sup>93</sup> It is a good general rule never to give pituitrin until the baby is delivered.

Eastman<sup>94</sup> reports the first case of rupture of the uterus following a Stürmdorf tracheloplasty, and Lackner<sup>95</sup> presents an experimental study on rupture of the uterus in goats. Lackner found that the intrauterine pressure required to rupture the uteri in which cesarean sections had been performed, was not affected by the type of incision nor by the character of the catgut.

Phaneuf<sup>96</sup> reports a case of inversion of the uterus and illustrates the operation he performed. White<sup>97</sup> elucidates the differences between contraction and retraction rings. Bailey and Driscoll<sup>98</sup> very thoroughly discuss shock in pregnancy and the puerperium, and present an outline of the etiology. In the treatment of shock they favor gum glucose and blood transfusions. Stone<sup>99</sup> reviews the literature on obstetric shock and reports three cases.

*Operative Obstetrics.*—During the last 5 years a rubber bag placed in the rectum was used 800 times by Klein<sup>100</sup> to stimulate labor pains and he reports success in 60 per cent and partial success in 20 per cent of these cases. Scott<sup>101</sup> claims good results in the induction of labor by means of pituitary preparations after castor oil and quinine. He emphasizes very properly that pituitary substances when used to induce labor should not be repeated once pains are established. To give the drug under such circumstances may result in disaster. Stone<sup>102</sup> analyzes the cases in which the cervix was dilated by means of a hydrostatic bag at the Johns Hopkins Hospital. The total maternal mortality was 5.6 per cent and the morbidity was 34.9 per cent. The total fetal mortality was 65.8 per cent and without the macerated fetuses it was 45 per cent. Madden<sup>103</sup> strongly condemns the use of the Voorhees bag in the induction of labor and believes that the only thing the bag accomplishes is preparation of the cervix for manual dilatation.

As Stone's statistics indicate, the use of a dilating bag is followed by a definite maternal and fetal mortality and morbidity. Hence we should use the bag or other mechanical means of inducing labor only for very strict indications. In the opinion of the reviewer, contracted pelvis is not an indication for induction of labor before term.

Wieloch<sup>104</sup> describes a rubber bag used for the purpose of replacing fluid in cases of premature rupture of the bag of waters and reports 7 cases in which he used it. Many years ago Stowe of the Chicago Lying-in Hospital devised a similar bag but found it to be impractical.

J. W. Williams and Sun<sup>105</sup> studied the histories of 2,523 women who had contracted pelvis. They found that the simple flat pelvis constitutes the contracted pelvis par excellence in the white woman and it may give rise to serious dystocia. Breech presentations occurred twice as frequently and transverse presentations thrice as frequently in contracted as in normal pelvis. The gross maternal mortality was 0.97 per cent and the gross fetal mortality approximately 12 per cent. The performance of 221 cesarean sections in a series of 2,275 labors, an incidence of 9.7 per cent, indicates that the authors have not been unduly radical. Bailey<sup>106</sup> analyzed 477 cases of contracted pelvis in which a trial labor was given and the success of this procedure depended upon the fact that the low cervical cesarean section was finally done in those cases in which the head did not engage. There were 59 cesarean sections with no maternal deaths. Among the 477 cases there was a maternal mortality of 0.42 per cent and a fetal mortality of 4.19 per cent.

Irving and Goethals<sup>107</sup> conducted or supervised all the breech extractions at the Boston Lying-in Hospital for a period of 12 months and their routine included careful auscultation of the fetal heart throughout labor, a policy of "hands off" during the first stage, except when because of lack of progress a Voorhees bag was inserted, and immediate extraction after complete dilatation of the cervix. They reduced the mortality from 9.78 per cent to 6.6 per cent. Many babies are injured or killed by manipulations done hastily and violently because of the fear of asphyxia; but as Potter has shown, great haste in breech extraction is not often necessary.

Williamson<sup>108</sup> describes a method of applying forceps to the transverse head in the delivery of persistent occipitoposterior positions which has the advantage of requiring only a single application. It is a combination of manual rotation of the head to a transverse presentation and the

application of the forceps with the posterior blade in the hollow of the sacrum and the anterior blade under the symphysis. Bacon<sup>100</sup> emphasizes the value of the Kielland forceps in the treatment of occiput posterior positions where manual correction fails. The Kielland forceps are gaining favor but the reviewer,<sup>110</sup> who summarized the literature of the use of these forceps in 1924, believes they should be used only by the experienced obstetrician. Barnes<sup>111</sup> also discusses the treatment of occiput posterior positions and suggests either podalic version and extraction, or bimanual rotation and forceps extraction. He advises thorough manual dilatation of the lower birth canal before either procedure. The reviewer would like to suggest thorough lubrication with green soap in addition to manual dilatation of the vagina; for it is immeasurably easier to perform a version and extraction or do a manual or instrumental rotation of the head after lubrication of the vagina.

Many papers have appeared on cesarean section. Lewis<sup>112</sup> analyzes the cases of cesarean section at the Cook County Hospital for the past eleven years and he favors what he calls the longitudinal fundal type. Polak<sup>113</sup> describes the technic of the transperitoneal cesarean section as it is ordinarily performed. Kerr and Hendry<sup>114</sup> also describe the cervical operation but they advocate a transverse incision in the uterus instead of a longitudinal one. They report 107 cases without a maternal death. In 1881, Kehrer<sup>115</sup> advocated a transverse incision between the fundus and the isthmus of the uterus.

J. W. Williams<sup>116</sup> analyzes 180 cesarean sections which he and his associates have performed. There were 122 classic operations with one death, 20 cervical operations with no deaths and 38 radical operations with 5 deaths. Williams emphasizes that large numbers of cesarean sections are done unnecessarily and that the mortality from the classic cesarean is low only when it is done at an appointed time at the end of pregnancy or during the first few hours after the onset of labor. The mortality increases rapidly with each hour elapsing after that time, to reach 10 per cent or more when done during the second stage of labor.

Broich<sup>117</sup> reviews 201 abdominal cervical cesarean sections in which the maternal mortality was 8 per cent and 157 vaginal cesarean operations with a mortality of 7 per cent. However, among 115 first transperitoneal operations for contracted pelvises, the mortality was only 1.7 per cent. Le Lorier<sup>118</sup> performed 17 cervical operations with one death and praises the operation while Cathala<sup>119</sup> who performed three of these operations, does not like it. Portes and Risacher<sup>120</sup> report 28 cervical operations with good results and Brindeau<sup>121</sup> performed 88 of these operations under spinal anesthesia with great satisfaction. McCann<sup>122</sup> advises eversion of the uterus, a high uterine incision and removal of the placenta and intact bag of waters before delivering the child. Rosenfeld<sup>123</sup> makes a suggestion for drainage in cesarean section. Klumper<sup>124</sup> believes the best way to treat the third state of labor at cesarean section is to leave the placenta in the uterus and express it in the usual way after the operation.

A clinical study was made by Wilson<sup>125</sup> of 133 pregnancies following cesarean section. Among the 39 deliveries through the natural passages there were no maternal deaths. Rupture of the uterus occurred three times in the entire series (2.2 per cent). The author makes valuable suggestions concerning the safety and prophylaxis of patients who become pregnant after cesarean section. In studying the pregnancies and labors



subsequent to cesarean section, Wille<sup>126</sup> found that rupture of the uterus occurred in 4 per cent and he believes the cause of the rupture is not to be found in the new pregnancy but in the complications of the previous operation. In a similar series of 21 pregnancies, Gladden<sup>127</sup> reports 3 ruptures of the uterus all of which occurred during labor. From a critical review of the literature, Wetterwald<sup>128</sup> finds that there have been only 10 ruptures of the cervix after the transperitoneal cervical cesarean section. The exact number of cervical operations performed is unknown but 3,600 have been reported in the literature; hence the incidence of rupture was only 0.28 per cent as compared with 1 to 4 per cent after the classic operation. Liepmann<sup>129</sup> performed a cervical cesarean section because a patient had a vulvar streptococcus eczema and placenta previa. The mother and baby left the hospital in good condition.

The foregoing reviews indicate that the cervical transperitoneal cesarean section is being performed more and more, and the reviewer is firmly convinced of its superiority over the classic operation. The cervical operation has a decidedly lower mortality and morbidity. It is followed by fewer adhesions, it permits a longer and more thorough test of labor, it more frequently permits delivery per vaginam later, and it is followed by far fewer ruptures in subsequent labors. The ten ruptures reported in the literature all occurred during labor and only 2 of the patients died. There is not a single report of a rupture during pregnancy; hence this horrifying accident with its alarming surprises under conditions and in places where there are no facilities to treat the condition has not occurred in spite of the large number of cervical operations performed. At the Chicago Lying-in Hospital up to the present time 566 cervical cesarean sections have been performed. There were 6 maternal deaths (1.06 per cent) but only 3 of them were the direct result of the operation.

*Uterine Hemorrhage.*—For the treatment of postpartum hemorrhage Muller<sup>130</sup> advocates the use of Henkel's clamps applied to the uterine arteries through the vagina. Somewhat analogously, Kerwin<sup>131</sup> advises ligation of the uterine arteries per vaginam in the treatment of placenta previa. Kellogg<sup>132</sup> in an excellent paper reviews 303 cases of placenta previa and in spite of his former opinion, now believes that all cases of central and partial placenta previa are best treated by the low abdominal cesarean section whether the baby is viable or not, living or dead. Marginal placenta previa is best treated by induction with the Voorhees bag. Wagner<sup>133</sup> who analyzes 172 cases, likewise believes that cesarean section should be used not only in cases of central but also lateral placenta previa, even when the child is dead. Siegel<sup>134</sup> maintains that placenta previa should be treated only in a hospital and by cesarean section in all clean cases. In definitely infected cases, conservative therapy should be practiced or cesarean section followed by hysterectomy.

By injecting histamin into animals, Hofbauer and Geilung<sup>135</sup> were able to produce the typical picture of abruptio placentae. These results are in harmony with the recent tendency pointing to the association of abruptio placentae with a toxemic process and indicates that a sudden access of histamin to the circulation might account for the occurrence of the abruptio. On the other hand, Browne<sup>136</sup> produced abruptio placentae experimentally by setting up an oxalate nephritis and then causing an exacerbation of the nephritis by introducing bacteria. Green-



Hill<sup>117</sup> reports 3 severe cases of abruptio placentae, the first of which occurred after the spontaneous delivery of the first baby of twins, and was most likely due to the sudden release of a large amount of liquor amnii when the second bag of waters ruptured. The second case was associated with eclampsia and the third, which was a case of uteroplacental apoplexy, occurred during an automobile accident. In the first case delivery was accomplished by version and extraction, in the second by cesarean section under local anesthesia and in the third, by cesarean section followed by hysterectomy. All three mothers recovered but two babies died in utero and one showed marked rigor mortis when delivered. Among nine severe cases of abruptio reported by Welz,<sup>118</sup> there was a maternal mortality of 83 per cent for the six delivered through the vagina and 33.3 per cent for the three delivered by Porro cesarean section. Fitz Gibbon<sup>119</sup> believes that abruptio placentae is the culmination of a slowly developed condition of the uterus due to chronic nephritis. It is never a rapid bleeding and treatment should be confined to restoring the collapsed circulation, keeping the patient alive and then terminating pregnancy by the simplest method which is by the natural forces.

Frankl<sup>120</sup> is convinced that subinvolution of the blood vessels of the mucosa is responsible for many hemorrhages which occur not only postpartum but also postabortum. Involution is prevented by rigid hyaline tissue which surrounds the blood vessels.

From a study of 1,000 cases, Scott<sup>121</sup> concludes that pituitrin given at the beginning of the third stage of labor definitely shortens the third stage, lessens the amount of blood lost, both in spontaneous and operative deliveries, and diminishes the frequency of retained placentas due to constriction ring. Jess<sup>122</sup> came to the same conclusions except that in his series the necessity for manual removal of the placenta was not lessened. The reviewer agrees with all of Scott's conclusions but he would like to emphasize that the pituitrin be given immediately after delivery of the child, because if given a few minutes later, a constriction ring occasionally results.

Haba<sup>123</sup> studied 107 cases in which the uterus was invaded for pieces of placental tissue and concludes that exploration of the uterus immediately after labor is not as serious a procedure as it is during the puerperium. Hence, when it is suspected that pieces of placenta remain in the uterus the latter should be explored immediately. Montag<sup>124</sup> who studied 147 cases came to the same conclusions. Haba's advice is good but it should be accompanied by the injunction that the asepsis associated with invasion of the uterus must be as perfect as possible. Fresh gloves should be used, the vagina should be flushed with an antiseptic solution, and as little manipulation done in the uterus as possible. In a home or in a general hospital where the delivery rooms are not very "clean," invasion of the uterus is often a formidable operation and should not be done without good cause. A patient should not be permitted to bleed too much before the placenta is removed, because excessive blood loss is one of the factors which renders manual removal a dangerous procedure in many cases.

(To be continued.)

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## Original Communications

### AN INQUIRY INTO THE CAUSE OF OLIGOHYDRAMNIOS\*

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CLINICALLY, oligohydramnios is regarded as of little importance since it occurs relatively seldom. From the theoretic standpoint, completely studied cases of oligohydramnios are highly intriguing, since, with the question of their origin, other questions of prime importance are bound up, whose clinical elucidation is difficult and experimental elaboration well-nigh impossible; namely, the problem of the origin of the amniotic fluid, and the question regarding the mechanism of certain malformations, especially of the uropoietic system. Thus viewed, each case of oligohydramnios appears like an experiment of Nature which comes to our aid in a condition which we are not able to produce artificially, an experiment that is of complete value only when we possess exact findings of the mother, fetus, and placenta. Of the cases reported in the literature very few include a description of all three.

At the Second Gynecologic Clinic, in Vienna, there occurred recently a case which presented the opportunity for exact examination of the mother, fetus, and placenta; all three of which presented noteworthy findings.

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See page 786.

CASE RECORD.—M. J., forty years of age, married. Admitted 4/11/26; discharged 4/24/26.

Anomalies: uterine inertia, premature fetus, club feet, oligohydramnios.

Previous history: tinitus aurium since 1922. In 1910, after her first delivery, ovariectomy was performed for cyst; gravida vi. Menses began at age of thirteen, every twenty-eight days; lasted three days, slight cramps. Last menstruation 8/5/25.

On admission: Temperature, 37.9° C.; pulse, 80. Slight varicosity of lower extremities; no edema. No sugar or albumin. Wassermann negative.

Vaginal examination: Cervix thickened, dilated to size of half dollar, vertex presentation, L. O. A., not fully engaged, membranes not ruptured. Pains very weak. After injection of pituitrin spontaneous delivery in thirty minutes was followed by a very small amount of amniotic fluid—about two tablespoonfuls. Placenta was delivered fifteen minutes later. Labor lasted fourteen hours. Temp., 36.6° C. The baby was a female, 43 cm. long, and weighed 2,000 grams; it had club feet. It lived thirteen hours.

Placenta: noticeably small, weight 370 grams, circular in shape, 140 mm. in diameter. Cord was eccentrically inserted, 3 cm. from the placental edge, but was not abnormally twisted. In several places it was flattened (Meyer-Ruegg), and here, on cross section, the vessels were arranged like a triangle instead of being aligned. The fetal membranes were of normal thickness and consistency. No abnormal denseness or toughness (Goldner, Jaggard) was observed either at delivery or in the prepared specimen. The amnion was smooth, moist, and glossy and stripped easily from the chorion. The placental portion showed several small infarcts but was also smooth and glossy. Several large vessels radiated from the point of insertion of the cord.

#### MICROSCOPIC FINDINGS

*Placenta:* most striking was the large number of leucocytes filling the intervillous spaces and giving the appearance of placental villi imbedded in a mass of pus. The leucocytes, between which on higher magnification a fine network of delicate fibrin filaments were seen, were more numerous and thicker on the decidual side of the placenta (Fig. 1). They decreased toward the amniotic side, but here there was an increase of red blood cells. The decidua, so far as it is preserved with the placenta, showed a loose infiltration of leucocytes, while the trophoblastic layer and fibrin stripe of Nitabueh were sparsely infiltrated. Clumps of leucocytes were in the intervillous spaces, several penetrating villi being thickly surrounded by them. On the placental side of the Nitabueh stripe, the leucocytes throughout were thicker and more numerous than on the maternal side. Nowhere has one the impression that the pus cells had wandered over from the maternal tissue to the placental; rather it appeared as if here and there isolated leucocytes from the intervillous spaces had broken through and wandered into the decidua. In the villi themselves the pus cells preponderated at the periphery. The lumens of several of the larger villous blood vessels contained numerous red and white cells, but not even in the large vessels near the insertion of the cord did we find the characteristic picture of an inflammatory infiltration of the vessel wall which alone could give the morphologic basis for the view that the leucocytes reached the inflammatory focus through the blood vessels. The walls of the larger vessels were entirely free of inflammatory changes, likewise the connective tissue of the villous stroma surrounding the vessels. The peripheral portions directly under the epithelium were thickly filled with leucocytes which elevated the intact epithelium, but did not infiltrate the villous stroma. Where the process had gone further the epithelium was lost and the free stroma was surrounded by a thick layer of pus cells which became confluent with other pus masses. Some villi showed all three conditions: intact epithelium, pus-lifted epithelium, and pus-destroyed epithe-

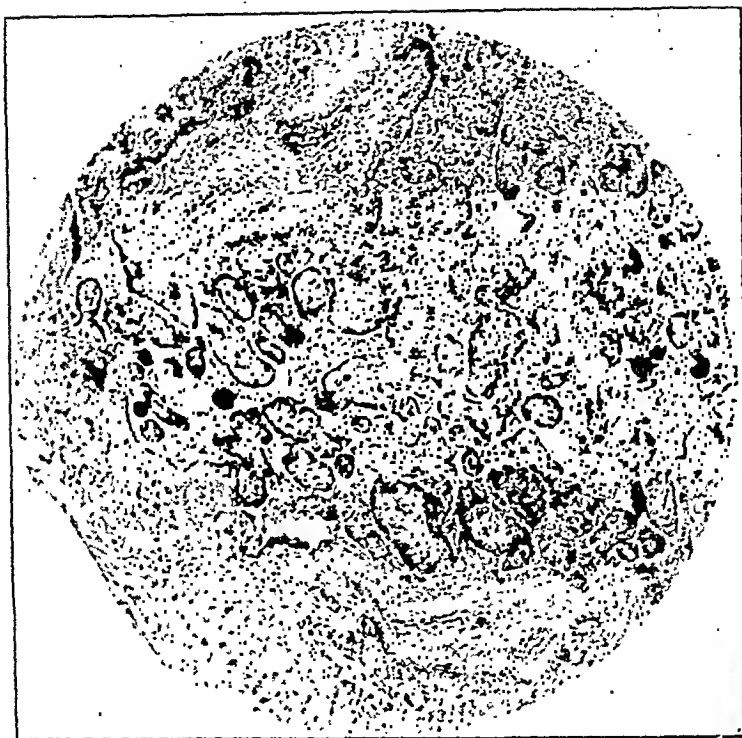


Fig. 1.—Lower left: amnion. Upper right: placental villi, below which several penetrating villi are seen. Thick masses of pus cells between the villi whose lining epithelium is in part destroyed.

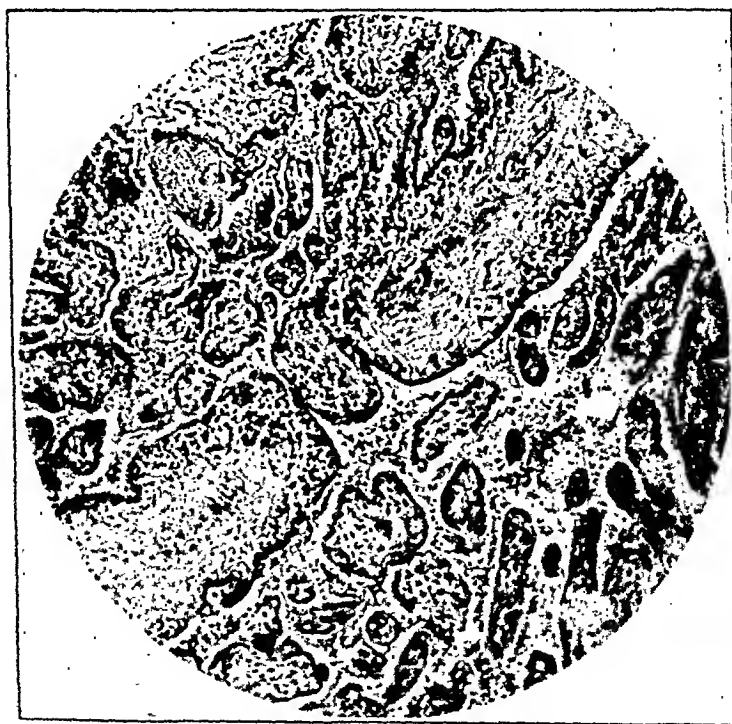


Fig. 2.—Placental villi, pus cells, and slender fibrin threads in the intervillous spaces. Upper right: epithelium of a villus lifted up by leucocytes and giving the appearance of a small vesicle. Lower left: a villus the epithelium of which has been lifted from its stroma, making a hood-like appearance.

lium (Fig. 1). Between the villi were many minute infarcts. Some surrounded ghosts of villi; some were spongy in appearance, permeated by trophoblastic cells, and showed leucocytic infiltration.

*The Chorion* on the free side showed pronounced edema of the subchorionic connective tissue. Abnormally large, light cystic cells were observed between which were many leucocytes. Pleomorphism of the chorionic cells was evident from the numerous strikingly large and darkly nucleated elements. The still adherent decidua showed edema, swelling, cystic degeneration and, to a slight degree, inflammatory infiltration. In the layer of chorionic cells were observed large, light, round, fibrin-like masses whose structure was shown to be loose connective tissue by Van Gieson's stain: ghosts of villi like those found normally in the early stage of the development of the chorion laeve as rests of the degenerated placental villi; in the mature placenta, occurring only exceptionally. Vorlaender lays special emphasis on this finding.

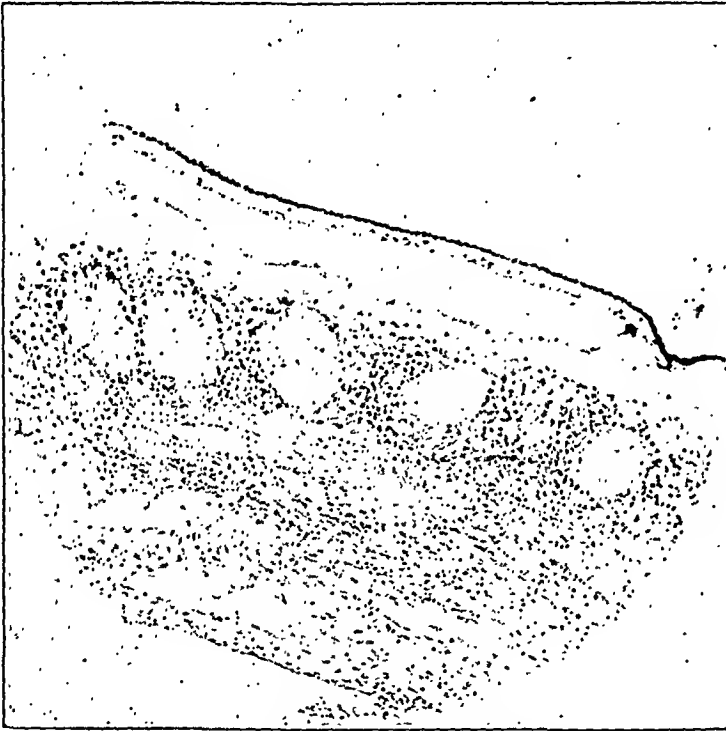


Fig. 3.—Section through the fetal membranes: the amniotic epithelium well preserved, edema in the chorioamniotic interspace, many ghosts of villi among the swollen, infiltrated chorionic trophoblasts.

*The Amniotic epithelium* was well preserved both on the placental and on the peripheral sides, only in a few spots of the placental amnion was it absent or degenerated. These spots showed a more or less vaulting of the connective tissue stroma combined with inflammatory infiltration. This vaulting and epithelial degeneration extended from the chorionic side toward the amnion (Fig. 4). On the placental surface were seen the typical two layers of cells: high cylindric and low cuboid with lighter protoplasm (Forsell). Adjoining, and more numerous, were areas with only one row of low cylindric or cuboid cells. Above the free edges of the high cylindric cells were masses of small and larger drops of secretion, but these were absent above the cuboid cells. On the fetal surface the amniotic epithelium was entirely normal, but showed nowhere high forms, only cuboid and flattened, which Naujoks describes as normal for the middle of pregnancy. Small defects in the amniotic epithelium without cell changes were first observed in oligohydramnios by Ahlfeld who attributed them to scratch marks by the hands or feet of the fetus. Similar defects occur

in normal placentas, in follicle cysts, and in serous cystomas, so that we cannot attribute Ahlfeld's findings to such a mechanical cause. The vacuolated structure and drops of secretion which Forsell describes as characteristic for the normal amniotic surface is nowhere observed. Histologically no ground can be found for attributing a secretory activity to the peripheral amniotic epithelium.

The Cord showed a well preserved layer of flattened amniotic cells. Wharton's jelly was relatively loose; in places the connective tissue fibers were widely separated by broad liquid-filled spaces: an edema easily explained by stasis due to twists of the cord. The muscle fibers in the blood vessels were loosely arranged. Masses of leucocytes occupied about a third of the lumina of the vessels but were not united by fibrin to form thrombi.

*Autopsy of Fetus (Dr. Matras).—Anatomic findings:* 43 cm. long; weight, 2,000 grams; female. General underdevelopment. Scalp edematous and hemor-



Fig. 4.—Section through the placental amnion. Right: epithelium well preserved, with normal amniotic connective tissue. Left: epithelium knocked off by inflammatory infiltration of the connective tissue.

rhagic. A large fresh clot over the entire hind brain, heavier over the right occipital lobe; blood clots in the subarachnoid space over the cerebellum, medulla, and at the base and posterior part of the cerebrum. Tentorium intact with hemorrhagic spots and streaks. Lungs not fully aerated, mottled from presence of red aerated and blue atelectatic spots. Air passages free. In both lungs subpleural punctate ecchymoses. Heart: normal size, foramen ovale and ductus Botalli wide open, membranous septum defective, muscular septum intact, vessels normal. Left kidney and ureter absent, both adrenals markedly small, left one lay deeper than normal. Right kidney compensatorily enlarged, was provided with double ureter. Tubes and ovaries normal. Stomach contained frothy mucus, small bowel empty except for some air, large bowel filled with meconium. Liver, spleen, and pancreas normal. Ureters entered the bladder on opposite sides, one crossing the spinal column to enter on the left side.

Three pathologic findings stand out in this case: (1) inflammation of the placenta, (2) oligohydramnios, and (3) maldevelopment of the uropoietic system of the fetus.

Inflammation of the placenta, aside from the chronic inflammation of lues, is a rare occurrence, particularly in cases at term or near term. The older literature has observed the occurrence of such non-specific inflammation of the placenta but did not concede its importance. Küstner, in his collected works, regards placentitis as a historic curiosity. Later, so many cases were observed that Seitz could report a whole series of them of various etiology in his chapter on Inflammation of the Placenta in Winckel's *Textbook*. More recently the reports have become rather rare so that Hinselman, in the chapter on Inflammation of the Placenta in Seitz-Halban's *Handbuch*, reports merely the older literature.

Of the well-described cases the one by Franqué appears to be the most characteristic and important: thirty-six years old, five normal deliveries; after excision of both lips of the cervix for erosion and discharge, became pregnant a sixth time, aborted at six months under high fever. The fetus, aside from its prematurity, was underdeveloped and underweight. The placenta showed widespread purulent infection in the intervillous spaces and in the decidua. Franqué favors endarteritic processes in the placental blood vessels as the important factor. It is interesting to note that he regards the pus cells as coming from two sources: partly from the chorionic vessels, but mainly from the autochthonous, spindle cells of the villous stroma. This local and autochthonous origin of the pus cells was again put forward by Busse and has since won more adherents. In our case, one gets the impression that the leucocytes came out of the villous stroma; no ground can be found for believing that they arose from the blood vessels. The most striking difference between the case of Franqué and ours is in the distribution of the pus cells. While in Franqué's case they lay in thick masses on the chorion and amnion and, from his description, only reached out from there to the villi and intervillous spaces, in our case the inflammatory infiltration of amnion and chorion and decidua was much weaker and reached its high point in the villi and intervillous spaces. In his case too, the amniotic epithelium is entirely gone while in ours it is well preserved.

Donath's case which shows the crossing of the pus cells from the endometrium to the chorionic villi and stroma, i.e., the ascent of the inflammation from the penetrating villi, agrees exactly with ours. The seven cases of amnionitis observed by Sentex cannot be included, as microscopic findings are lacking. Urfe, like Franqué, makes note in his case of the spread of the inflammation of the decidua to the villi, together with the marked vessel changes in the latter. Seitz describes a case where the patient died in labor of eclampsia, which shows relatively mild small cell infiltration under the serosa with continuous increase towards the decidua. Since the bacterial findings were negative he considered the infiltration as chemi-cotoxic. Albert describes a collection of pus behind the placenta and membranes that actually lifted the latter. The cases of Santi and Bereny were of abscesses in the placenta and cannot be considered analogous to ours as cases of diffuse inflammation. Heinlein has described inflammation, bleeding and necrobiosis in the layer between the chorion and the decidua as causes of premature rupture of the membranes, but did not observe inflammation of the villi.

Despite thorough search and staining we were unable to find bacteria in any of our sections. The diffusion of the leucocytes, the entire absence of local abscess formation, and local cell destruction also speak against the presence of bacteria. The mildness of the infiltration points more to the picture of a diffuse subacute or chronic inflammation which we are accustomed to find where a tissue is not attacked by germs but is affected by toxic products. Moreover, no bacteria were found in the few decidua rests attached to the placenta. That microorganisms are easily shown in nonspecific or purulent inflammation of the placenta is proved from the cases of Albert, Walthard, and Seitz. For in inflammation of the placenta due to staphylococci or streptococci the conditions are different from those found in chronic inflammation due to the *Spirocheta pallida* where the active organism can only be shown relatively seldom. We can, therefore, say with certainty that in our case no pyogenic organism passed over the Nitabuch stripe and infected the chorion. The inflammatory reaction can only be explained by supposing that, like in the eclamptic patient of Seitz, toxic products from an existing irritant in the endometrium passed either directly through the Nitabuch stripe and its layer of trophoblasts or through the maternal capillaries in the intervillous spaces, and set up a sterile inflammation of the chorionic villi. Confirmatory is the diffuse character of the inflammation and the absence of necrotic foci or abscess-like formations which usually form in the vicinity of the intervillous spaces from the irritation of a pyogenic organism: staphylococci, streptococci, or even tubercle bacillus. Albert, particularly, refers to direct infection of the endometrium through vaginal germs, and has described this as latent microbial endometritis in pregnancy. He found in 6500 cases, during three years, eighteen such cases of infection of the decidua. Walthard has observed bacteriotoxic endometritis where the irritant,—saprophytic streptococci, staphylococci, colon and proteus bacilli,—lived in the uterine secretion but did not penetrate the mucous membrane, yet through its toxin produced an endometritis. So long as the tissue is normal it can prevent the penetration of germs; but if it becomes injured, as through disturbed circulation, then the germs lay aside their saprophytic character and become infectious parasites. If pregnancy occurs, the growth of the ovum may be uninfluenced, at least for a time (Walthard).

A preceding bacteriotoxic endometritis cannot be ruled out in our case because of the failure to demonstrate bacteria by staining methods, since they may have been in deeper layers of the decidua or in the uterine secretions. The long duration of the pregnancy, the quick fall of fever, and the smooth puerperium all speak for a mild, localized, and surface infection. The gradual decrease in the diffuse infiltration from the maternal toward the fetal side favors the conclusion that the



causes of the inflammatory infiltration are toxic substances which form on the maternal side and penetrate the fetal in decreasing strength. Weiss has described a series of cases of premature separation of the placenta in nephritis with leucocytic infiltration of the decidua where the toxic irritant was not bacterial but metabolic. That there is a direct passage by osmosis from the intervillous spaces through the fetal membranes to the amniotic fluid is shown by the case of Gusserow (sulphuric acid poisoning of the mother, positive reaction for sulphuric acid in the amniotic fluid, negative in the fetus), by the researches of Zuntz, of Wohlgemuth and Massone, and also by the cases of foul decomposed amniotic fluid in feverish mothers with normal, healthy, and active children (Briegleb, Gerhartz, Lehman, Charpentier, Lindenthal). That these latter were cases of resorption of toxic substances from the inflamed placenta into the amniotic sac and that the fever of the mother cannot be explained by the primary decomposition of the amniotic fluid with secondary resorption of the decomposition products through the fetal membranes is shown by this experiment of Gusserow on a pregnant bitch: injection of strychnine into the intact amniotic sac showed no reaction on the part of the mother; but she immediately developed tetanic convulsions when the sac was opened into the peritoneal cavity. Hellendahl demonstrated that not only toxic substances but also bacteria can penetrate the intact fetal membranes. He showed that colon bacilli introduced into the vagina, peritoneum, or blood stream of a pregnant bitch with intact fetal membranes appeared in the amniotic fluid in twenty-four hours.

Can we consider the oligohydramnios in our case as due to the inflammation of the placenta? The literature shows no case that is quite similar. The case of Franqué was rather one of hydramnios which had ruptured two days before delivery with the evacuation of a large amount of fluid, so that at delivery the case was one of secondary and mechanical oligohydramnios. The primary polyhydramnios Franqué regards as due to inflammatory separation of the amniotic epithelium which regulates the physiologic production of the amniotic fluid. Where it is missing, the way lies free for an unregulated diapedesis with excessive filtration. Similarly Forsell has observed disappearance of the cylindrical cells in hydramnios and so attributes to them the duty of regulating and controlling the production of amniotic fluid, while the basal cells he regards as concerned in the regeneration of the epithelium. In our case the amniotic epithelium is entirely preserved. The few places where the inflammation has penetrated the subamniotic connective tissue and caused loss of epithelium are not important. It is different with the structure of the cells themselves. Forsell's normal differentiation of high and low columnar cells is seen in only a few places. The placental amnion

shows mainly low cylindric cells without evidence of secretion. This evidence, the before mentioned granules, so noticeable in the areas covered with high cylindric epithelium is almost entirely lacking over the placental amnion and entirely lacking over the whole peripheral amnion. The impression here is not of a broken, flattened, degenerated cuboid epithelium. If the amniotic fluid is regarded entirely or to a great extent as a product of the amniotic epithelium, as proposed by G. A. Wagner and concurred in by Hinsehnman, then the lack of fluid in our case is easily understood. The epithelial degeneration, evidenced morphologically by its flatness, is functionally bound up with decreased secretion. That the section in our case showed cell forms which Forsell and others found in hydramnios is not to be marvelled at with our imperfect microscopic methods, just as no microscopic change in the amniotic epithelium may be found, as pointed out by Schüller in a case of oligohydramnios. It is not difficult to recognize histologically droplets of secretion in protoplasm where it is merely a question of gross appearance between the two. However, where the process is one of a diapedesis of unstainable fluids or salts this visualization in the stained specimen is of course out of the question. So in the renal epithelium we are often unable to observe the morphologic signs of certain partial dysfunctions, cases of oligurie and cases of polyurie chronic nephritis showing the same histologic picture of the tubular epithelium. It is therefore quite likely that in both oligo- and polyhydramnios it is merely a question of partial dysfunction which we are unable to see morphologically,—in the former an abnormally low osmosis of water, in the latter, an abnormal osmosis for salt which produces secondarily a pathologic accumulation of fluid.

Fressel has lately demonstrated cases of poly- and oligohydramnios and points out in both the same microscopic findings in the amniotic epithelium: necrobiosis. Consequently he did not consider the damaged epithelium in polyhydramnios as due to overstretching but as a primary condition,—just as in oligohydramnios.

That in our case the degeneration of the amniotic epithelium is a result of subamniotic inflammation, namely, of the subchorionic connective tissue, is scarcely doubtful. The amniotic epithelium as the filter for all substances passing from the placental connective tissue directly into the amniotic sac must, to a great degree, have its own nourishment influenced by these filtered products, and it is evident that in chronic inflammation of this connective tissue the amniotic epithelium covering it would degenerate in sympathy. Where the inflammation extends directly to the epithelium it dies and is thrown off; where it is affected only by inflammatory products it remains well preserved. Its secretory function, however, is changed. The sequence is the same between chorion and amnion as between decidua and chorion. In inflammation of the decidua by infectious irritants

the toxic products penetrate into the chorion but produce here no infection, only a chronic inflammation. The products of this chronic inflammation penetrate to the amniotic epithelium and produce no longer an inflammation but a degeneration, so that the degeneration of the amniotic epithelium is the final result of a doubly attenuated infection arising in the decidua. This gradual attenuation through the double filter of chorion and amnion may well be the reason why abortion does not occur at the beginning of pregnancy as is the rule in direct infection of the placenta. The striking fact in our case that despite continued fever the patient could continue her pregnancy so long, can only be explained by the protective action of the chorion against the penetration of microorganisms. A further proof of this action is the absence of any sign of acute or chronic inflammation of the fetus. The accumulation of leucocytes in the vessels of the cord and in some of the villous vessels finds no analogue in the fetus; it is merely one of the limited placental findings, perhaps occurring in the agony of the last few hours before birth.

In the fetus itself we find malformations which can only in part be directly connected with the oligohydramnios. Malformations of the lower extremities are found in a large percentage of cases. That the club feet are a mechanical result of the oligohydramnios admits of no argument. Here the connection between lack of space as the cause and club feet as the effect is quite clear. Other forms of such mechanical damage to the fetus also occur: fracture of long bones (Link), bending of long bones (Reichel), flattening of the skull (Bonnaire and Schwab), but most frequently club feet (Merkertschianz, Hoehsinger, Küstner, Jaggard, Vorlaender, etc.). The many reported cases of ichthyosis must be attributed to pressure or drying of the skin, i.e., the external effect of the oligohydramnios on the skin; not, as some authors would have it, that the ichthyosis is the cause of the oligohydramnios by its disturbance of the secretory action of the skin. Against this are the cases of ichthyosis with normal amount of amniotic fluid reported by Ahlfeld. Apparently where ichthyosis and oligohydramnios occur together the closely related epithelium of skin and amnion are similarly damaged.

More difficult to explain is the connection between kidney malformations and oligohydramnios. If the kidney malformation is regarded as the primary cause and not as an accidental occurrence then our case could add confirmation to the view that the renal secretion of the fetus plays an important rôle in the production of the amniotic fluid. This view was given a setback by A. G. Wagner, who reported many cases of aplasia or atresia of the urinary system with normal or even excessive amounts of amniotic fluid. Hinselman accepts Wagner's work, especially as since its appearance in 1913, through improved staining methods (Cunningham, Wislocki), new evidence of the importance of

the amniotic epithelium in the production of the amniotic fluid was brought out. In our case the oligohydramnios could be sufficiently explained by the degeneration of the amniotic epithelium without making it necessary to attribute it to the kidney malformation. Nevertheless the proportion of cases of oligohydramnios with anomalies of the urinary system is strikingly high. Neumann reports 9 in 45 cases, or 20 per cent. From these must be deducted those cases (and the one described by Neumann) which showed such extreme deformity of the lower half of the body that the malformation of the urinary system as being due to pressure could be excluded. Important are cases like that of Strassman showing complete kidney aplasia; or of Jaggard, showing complete absence of the left kidney and left ureter, absence of rectum, imperforate anus, right cystic kidney and double club foot. A surer proof that kidney malformation can occur without outward pressure is the case of Hürzeler: oligohydramnios, agenesis of both kidneys but no external deformities. Here, as in our case, the deformities cannot be explained as entirely due to pressure. Pressure, to cause severe changes in the pelvic organs, must, as in Neumann's case of siren, severely alter and deform the lower extremities and pelvis. Normal structure of the bones of the pelvis and lower extremities even if combined with club foot or hip dislocation rules out pressure on the pelvic organs. Such mechanical deformity may perhaps occur in cases of siren from pressure of the tightly fitting amnion on the caudal end of the fetus, preventing the free development of the pelvis and lower extremities. This connection can only be applied to a few cases. Of 72 cases of siren described in the literature Neumann can only point out four (cases of Klaus, Westphalen, Zichorins, and Lange) that were combined with oligohydramnios. In these cases the possibility that we are dealing with coordinated defects cannot be ruled out. This is the assumption of Bolk who believes the cause of siren to be a change in the germ plasm. Opposed to him are Dareste, Gebhardt, and Schwalbe who see as the primary cause a failure of development of the caudal cap. Opposed also are Slingenberg, Ahlfeld, Raband, and Neumann who rightly point out that the defects of development in siren are of a different nature from those cases where the cause can be traced back with certainty to a pathologic position of the amnion: deformities or amputation of the extremities by Simonart bands, etc.

Typical deformities from cramped amniotic space are found in ectopic fetuses (Winckel) which have reached a higher stage of development. Here are observed typical deformities of the extremities, club feet, crooked extremities, etc., all easily explained by outside pressure. Siren or even malformation of the urinary system, with normal pelvis, in an ectopic fetus is not described in the literature. Certainly the early and later development of the extrauterine fetus is influenced

largely by the lack of amniotic fluid. If the fluid is lost at an early period, or lack of space occurs because of poor conditions for growth then the fetus cannot go to complete or near complete development. We must conclude that when there is a direct connection between kidney malformation and oligohydramnios the latter occurs at a very early stage. Neumann finds among the 49 cases of oligohydramnios ten with malformations of the urinary system: the cases of Jaggard, Haeh, Hoehsinger, Hoene, Strassman, Hürzeler, Claus, Westphalen, Cichorius, and Lange. To these are to be added Neumann's case, the one of Opitz (acute nephritis of the mother, hydrops of the fetus and placenta with oligohydramnios, atrophy of the fetal kidneys); the case of Bertkau (precipitate birth in a twenty-four-year-old primipara, half a cup of amniotic fluid, complete membranous closure of the urethra without other anomalies), and since 1923 the three cases of Vorlander without kidney malformation, and the case of Walz (sirenomelus with complete absence of amniotic fluid, absence of the genitals, atresia ani, absence of urethra, defective left radius, club foot with polydactylia [left], elocaa, in place of kidneys, a conglomerate pinhead-sized vesicle, both ureters present, as in our case). So that the statistics to date show 57 cases of oligohydramnios of which 15 present malformation of the urinary system. This percentage is not high enough to establish an absolute connection between oligohydramnios and malformation of the urinary system as cause and effect. The probability is that both disturbances are coordinate processes. In cases like ours where only certain organs are malformed, as the urinary, it speaks against pressure as the cause, for it is unlikely that the pressure would select only these organs and leave the neighboring ones untouched. Moreover, as pointed out by Ahlfeld, the decrease or disappearance of the amniotic fluid takes place in the latter half of pregnancy, a time when the aulage and development of the pelvic organs have long since taken place.

A case of unilateral long kidney with double ureter similar to ours is described by Kermann. Fischel attempts to explain this anomaly. Employing the researches of Schreiner on the primitive kidney as a basis, he regards the final development of the kidney as a product of the meeting of the kidney bud and of the ureter bud with the mesonephros. If one of these components is lacking or fails to unite with the others then the later kidney fails to develop. Fischel proposes two possibilities for the occurrence of the long kidney: either that on the side of the double kidney more metanephrogenic tissue developed which by encroachment diverted to itself the ureteral bud of the opposite side; or that the opposite ureter itself, because of more rapid growth, grew into the metanephrogenic tissue of the double kidney, the double stimulation of the two buds producing a larger kidney from no greater amount of existing metanephrogenic tissue. Both theories rule out

conditions in the fetus as the cause of the anomalies and make it unnecessary to put forward external influences from pathologic conditions in the amnion. In our case the first theory appears the more probable.

The inflammation of the decidua and placenta can well account for the maldevelopments having their beginning at a very early stage, in fact, at the very anlage of the metanephrogenic tissue. The normally imbedded ovum is entirely surrounded by normal decidua and its nourishment, while not quantitatively equal at all points (richer at the basal part) is qualitatively the same. If, as in our case, the imbedding takes place in an inflammatory altered decidua it can well be that through the unequal distribution of the inflammation and its products, toxic substances in various concentrations penetrate the ovum at different points; or, consequent on the inflammatory hyperemia and richer nourishment, these points remain altered. The result of this is checking of the one side and overdevelopment of the other and this can well explain the left-sided anomaly in our case, possibly combined with excessive anlage of the right side. That the left side is most often affected is not entirely accident. Ballowitz pointed out that in males one-sided absence or malformation of the kidney occurred more frequently on the left side. W. Kornfeld makes the same observation. Anomalies of the kidney in females, while occurring less frequently, also appear to favor the left side, as do other one-sided anomalies in oligohydramnios (cases of Walz and Jaggard).

The question still remains whether the oligohydramnios is not really the result of the kidney malformation. This brings us to the much discussed subject as to how great a part the fetal urine plays in the production of the amniotic fluid; a problem variously and oppositely answered by different authors. In our case the kidney, though malformed was, from all indications, not disturbed in function. Microscopic section of the kidney parenchyma shows throughout normal structure, and the size of the kidney permits the deduction that it fulfilled the work of two kidneys. Moreover the parallelism between performance and size is not so exact that we can say a small kidney, by increased secretory activity, cannot excrete the same amount of fluid as a larger one. The quantity of urine excreted depends only partially on filtration, and often with shrunken parenchyma, as in contracted kidney, the amount is increased instead of decreased. If we accept lowered kidney function, then the question remains whether we must in fact attribute the oligohydramnios to the decreased excretion of fetal urine. Hinselman accepts fully the work of Wagner and with Schaller gives to the fetal urine no, or a very minor, rôle in the production of the amniotic fluid. Opitz, Gusserow, Runge, Zweifel, Dührssen, Schatz, and Nemmann, on the contrary, on the basis of clinical observations and animal experimentation, regard the fetal

kidneys as the most important if not the sole producers of the amniotic fluid. They have their main argument on the large percentage of malformations of the urinary organs occurring in oligohydramnios. If these malformations are not accepted as a coordinate process of the oligohydramnios then their frequency speaks for the fetal kidney as producing at least a part of the amniotic fluid. Opposing examples are not lacking to show that the failure of the kidneys can be compensated and overcompensated by the amnion: the case of Balard,—hydramnios, dead fetus, agenesis of the kidneys; the cases of Benthin, who, in unioval twins, despite great differences in the quantity of amniotic fluid, found practically the same sized kidneys. The numerous cases of oligohydramnios with normal kidneys is clear evidence that they are not the decisive element in the production of the amniotic fluid. This fact is further borne out by those cases with a normal amount of amniotic fluid despite absence or malformation of the kidneys or closure of the urinary passages. These numerous cases of kidney malformation, with normal amniotic fluid on the one hand, and normal kidneys with oligohydramnios on the other, speak against a direct cause and effect between kidney malformation and oligohydramnios. That the fetal kidneys play some rôle in producing amniotic fluid appears reasonable from our and other cases reported. However, it is not a question of the kidneys producing a fixed amount of fluid but rather secreting a small amount of highly concentrated solution bearing no relation to the quantity of fluid produced by the amnion, but perhaps acting as an irritant to the amniotic epithelium, stimulating and continuing its activity, just as the urinary salts act as a diuretic on the kidney (Munk). Feis showed that the fetus is able to excrete through its kidneys urinary products introduced into it through the blood of the mother. Wolf was able to produce hydramnios in a pregnant bitch by performing a double nephrectomy, practically reproducing artificially the case of Opitz (hydrops of placenta and fetus, agenesis of fetal kidneys, nephritis in the mother). The action of the fetal urine on the amniotic epithelium must be imagined as a secretory activator and not merely as the producer of a mechanical diffusion toward the place of higher concentration, for such a diffusion would only equalize the osmotic pressure, while actually the amniotic fluid shows a low concentration compared to the serum (Resinelli, Jaquet, Meissel, Zangemeister, Gruenbaum). That high concentration of the fetal urine takes place, especially in prolonged labor, is proved by the frequent presence of uric acid infarcts in the kidneys of the newborn. It is, therefore, entirely logical to visualize the fetal kidneys as producing small quantities of a highly concentrated urine, and this acting as the irritant which stimulates the amniotic epithelium to secrete a fluid of low concentration.

## COMMENT

Analyzing the findings in our case we believe the following to have been the sequence of events:

1. *Before pregnancy*, an edometritis not acute enough to prevent imbedding of the ovum in the decidua, but able to affect the embryo through the production of toxic substances.

2. *Through inflammatory hyperemia* one side was nourished more than the other, causing an unequal development of the fetus by favoring that side and checking the other, the result being a long kidney on the right side and aplasia on the left.

3. *An extension* of the inflammation of the decidua to the placenta, then to the chorion and from this to the amnion, where it produced in places a loss of epithelium and everywhere a decrease in its functional activity leading on to the production of the oligohydramnios.

4. *At a very early stage* of pregnancy the oncoming oligohydramnios, by pressure and mechanical cramping, produced the malformations of the lower extremities: club feet.

5. *The inflammation* of the placenta, verging on localized abscess formation in the basal portion, accounts for the premature delivery.

We find no proof that the amniotic fluid is dependent on any one specific factor. The fetal skin must be ruled out entirely. The evidence for and against the fetal urine is entirely too contradictory. We find no histologic proof of a secretory action of the amniotic epithelium. However, we believe that the amniotic fluid has its source in the interlocking action of the fetal urine and amniotic epithelium; the former activating the latter to secretion.

We find no ground for considering the malformations of the kidneys as the specific cause of the oligohydramnios, nor conversely for considering them the result of the oligohydramnios. We consider the inflammation of the decidua (endometritis) the primary and important etiologic factor. The malformations of the kidneys, and the oligohydramnios, though they do not arise synchronously, we regard as coordinate processes secondary to and resulting from the primary factor.

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While rectal examinations during labor are very convenient, they have nevertheless potential dangers, for anaerobic bacteria and *B. coli* may thereby be brought into the aseptic field. In making vaginal examinations the edge of the cervix should be strictly respected and should not be passed by the examining fingers. The cervical border separates the bacteria-free zone of the birth canal from that which contains bacteria and therefore the author distinguishes a "vaginal" examination from a "cervical" examination.

When bacteria reach the uterine cavity during the puerperium, the uterus is well contracted and no harm usually results. However, if bacteria should reach the uterus during labor, infection is the common result. A cervical examination favors the premature introduction of bacteria. Thus is explained the connection between cervical examination and early puerperal infection. In making a vaginal examination the proper procedure is to palpate the fetal head by passing the fingers up to the fornices of the vagina.

J. P. GREENHILL.

## ECTOPIC ENDOMETRIUM IN THE OVARY AND INGUINAL CANAL\*

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DURING the past few years the gynecologic world has been much interested in the subject of ectopic endometrial tissue, largely through the magnificent research work of Sampson. The theory which he propounded of endometrial implantation on the ovary and other pelvic structures has served to stimulate investigators in renewed effort to establish the origin of this puzzling condition.



Fig. 1.—Chocolate cyst of right ovary, and the right tube.

Much has been written for and against the theory and Sampson himself has kept an open and unbiased mind as to its application in all types of cases. It is therefore with no thought of establishing a concept of the origin of heterotopic endometrial tissue, but rather to put on record my observations that I present this case, which recently came under my care.

Miss S., aged 30, had noticed a lump in the right inguinal region near the large labial fold, for the past five years. This lump was slowly getting larger and more annoying to the patient. During her menstrual periods, which were normal in every

\*Read at a Joint Meeting of the Chicago and St. Louis Gynecological Societies, at Chicago, December 4, 1926.

way, the mass would become tender and slightly larger, and at this time she would also have rather severe pain in the right lower abdomen.

In the small town from which she came a diagnosis of hernia was made and



Fig. 2.—Tumor mass from right inguinal region showing round ligament grasped in forceps.



Fig. 3.—Typical endometrial gland surrounded by stroma taken from inguinal mass.



Fig. 4.—Tissue spaces lined with epithelioid cells arranging themselves into gland-like formations.

operation advised. This did not satisfy the patient, and she came to St. Louis, where she was referred to me.

Examination showed a poorly nourished, poorly developed, extremely nervous woman, with no demonstrable organic lesions, except that in the right inguinal region, extending well over toward the mons and down under the right labial fold,

a firm, slightly tender fixed mass about the size of a large hen's egg could be palpated. Everything else externally was normal.

Vaginal examination showed a cystic tender rounded tumor mass, in the region of the right ovary, about the size of a small orange, or tangerine. The rest of the pelvis was normal.

A diagnosis of tumor of the right round ligament and a right ovarian cyst was made and operation advised.

At operation the abdomen was opened in the midline and a typical large chocolate cyst of the right ovary exposed. This, together with the right tube were removed and, as all other organs were normal, the abdomen was closed (Fig. 1).

A second incision was next made over the inguinal canal, and the mass carefully dissected free. It was firmly adherent to the pubic arch, and extended well into the upper large labia. As the dissection proceeded, the round ligament became

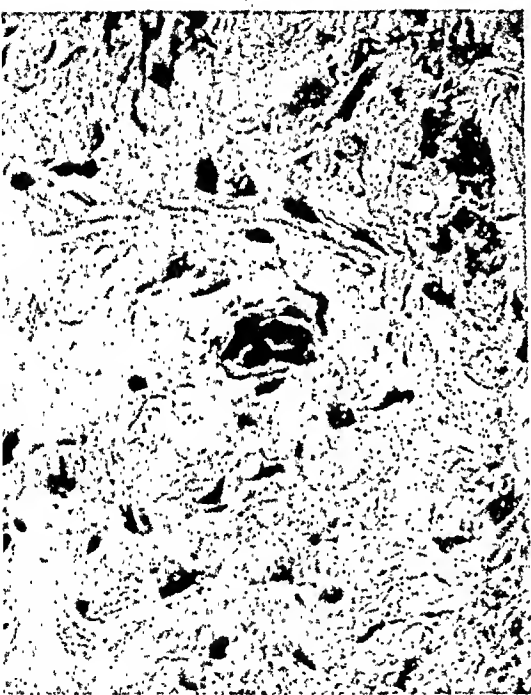


Fig. 5.—Large cell elements passing along the lymphatics or tissue spaces.



Fig. 6.—Gland-like structures from rim of chocolate cyst opposite hilum of ovary. No endometrial stroma.

visible and was found to terminate abruptly in the mass so that when the latter was completely freed from its bed, it was attached to the ligament much as a pear is attached to its stem. The round ligament could be freely pulled in and out by making traction on the growth, but no connection existed between the canal bed and the abdominal cavity. After removing the mass the ligament was firmly sutured to the facial planes, and the wound closed without drainage. Uneventful recovery (Fig. 2).

Histologic examination revealed the very interesting structures so characteristic of ectopic endometrium. The inguinal mass proper being made up of large clumps of gland tissue surrounded by deep layers of endometrial stroma, with frequent hemorrhagic areas, the whole being imbedded in a firm connective tissue framework (Fig. 3).

Sections from the cystic ovary showed glandular tissue with less distinctly marked stroma, but very closely resembling certain areas found in the tumor mass proper.



Fig. 7.—Active proliferation of endothelial lining of a small capillary or lymphatic space.

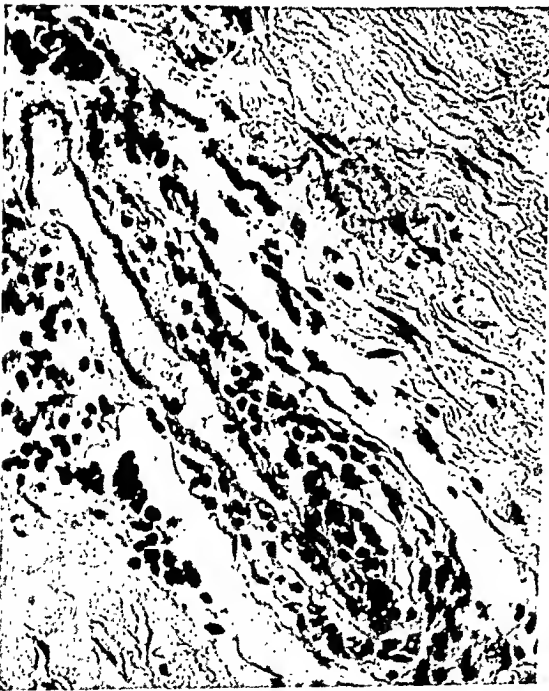


Fig. 8.—Capillary vessel showing early endothelial proliferation surrounded by cells which are indistinguishable from stroma cells.



Fig. 9.—Cross section of small capillary with endothelial proliferation surrounded by cells indistinguishable from stroma cells.

The inner wall of the chocolate cyst was covered with a layer of flattened epithelium broken in places with free blood just beneath the surface, which in spots streamed out into the cyst cavity. Marked congestion in all vessels was a prominent feature.

In another portion of the cyst wall a most peculiar group of structures was present, consisting of spaces lined with epitheloid cells which seemed to arise from the surrounding tissue, and which cells were definitely arranging themselves into gland-like formations of a very early type (Fig. 4).

Again we see in the inguinal tumor proper large cell elements, passing along the lymphatics and tissue spaces, forming small clumps here and there without further differentiation (Fig. 5).

Thus far the ovarian sections have been taken from the upper pole of the cyst where embryonal remnants might be expected to exist. A section was therefore made from the most distant portion of the cyst wall opposite the hilum of the ovary, and again definite gland structures were encountered with, however, no indication of endometrial stroma (Fig. 6).

In another segment of the cyst a small vessel or tissue space is seen where portions of the endothelial lining seem to be in a state of active proliferation (Fig. 7).

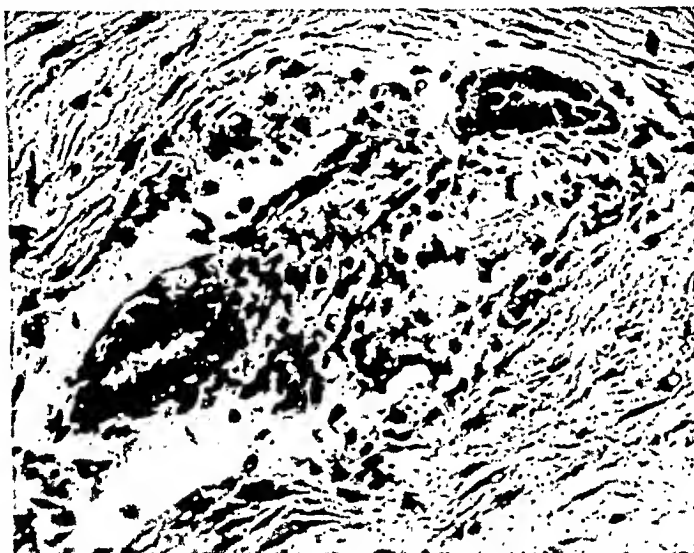


Fig. 10.—Early gland formation with stroma cells closely resembling capillaries with endothelial proliferation.

Lastly, in sections taken from the inguinal mass, we see numerous capillary vessels showing various degrees of proliferation of their endothelial lining, surrounded by cells which are indistinguishable from stroma cells, taking on characteristics which so closely approach typical endometrial tissue that the presumption of the origin of ectopic endometrium from capillary endothelium, is strongly suggested (Figs. 8, 9, 10).

It is hardly within the province of one whose experience is limited to a single case to interpret the various pictures here presented. If one may be permitted, however, to speculate a bit, various avenues may be opened for further discussion.

The coincidence of a tumor mass in the inguinal region entirely extraperitoneal, and a growth in the ovary on the same side, both showing histologic pictures which are quite similar in character, is most interesting.

That the extraperitoneal growth did not arise from an endometrial implant is quite clear. How then did the ectopic tissue reach this area?

Whether the large cell elements coursing along the lymphatics as seen in one of my sections, is an indication of a metastatic process linking the inguinal growth to the ovarian cyst, can only be surmised. If true, it would meet the metastatic conception of Sampson, but not in the sense of a transportation of complete endometrial units, as pictured in his sections, but rather as primordial cells with a capacity for further differentiation, or at least possessing stimulating qualities which would tend to bring about cell proliferation in the capillaries through which they pass.

The areas of primitive gland formation seen in the various sections may perhaps give us a clue as to the origin of this peculiar growth. One of two possibilities exists here; either we are dealing with primary cells, embryonal in character which are now taking on a higher form of differentiation, or we are dealing with a metaplasia of the endothelial cells which line the finer capillaries and lymphatics throughout the tumor.

Obviously, it is impossible for me to state which condition exists, but an impression gained from a careful study of my slides, would lead me to incline toward the idea of a metaplasia. This impression is strengthened by the experience gained in my study of endotheliomas of the ovary and by the very suggestive behavior of the endothelial lining of the capillaries and lymphatics which can be noted in my section.

501 METROPOLITAN BUILDING.

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## PRIMARY CARCINOMA OF FALLOPIAN TUBE, WITH REPORT OF THREE CASES\*

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THE earliest authenticated case of this rare condition, reported by Orthmann in 1888, was quickly followed by a case of Doran's and one by Kaltenbach in 1889. As previous writers, even Schroeder, in 1887, had denied the probable existence of such a condition, few came to light and even in 1892 Zweifel regarded it as an extremely rare entity.

With the advancement in the pathologic study of material, many more cases were reported, Peham collecting 61 in 1903, Orthmann 84 by 1906, Doran 100 by 1910, and Bower and Clark 133 cases in 1925, which they felt were all unquestionable. Now some 200 odd cases have been reported. To give a little better idea in comparative fig-

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\*Read before the Section of Obstetrics and Gynecology of the New York Academy of Medicine, December 28, 1926.

ures, Vest in 1914 found 4 out of about 19,000 gynecologic admissions to Johns Hopkins Hospital and we have seen 3 in about 30,000 similar patients at Bellevue Hospital since 1911. Thus, it begins to assume a frequency to force our consideration when we are dealing with adnexal conditions.

Theoretically, as regards its method of origin, there have been two main schools led by Doran and Fearn, and Sanger and Barth. The former believe it to represent a malignant change occurring in a benign papillomatous condition of the tube lining, resulting from a preexisting salpingitis. A case described by Roberts illustrates this view nicely, showing a tube filled to overflowing with a papillary growth and giving a history of sanguineous vaginal discharge similar to that found in the tube. Sanger and Barth, with a theory mentioned for consideration by Ewing, on the other hand, believe it occurs a long time subsequent to a chronic, probably purulent, inflammation of the tubes, usually occurring about the time of the climacteric. Though we find that a number of the unilateral cases are accompanied by such a chronic process in the opposite tube, and others by tubo-ovarian cysts, reminding one of the retort-shaped tuboovarian abscess, it is impossible, of course, to determine whether this inflammatory condition was existent prior to or concomitant with the carcinoma.

It seems hard to reconcile all of these premises, however, with Bower and Clark's case at twenty-five, Norris' at twenty-seven, and ours at twenty-nine and thirty-one years of age. In fact the first mentioned, a para ii, had a child four years previous to the discovery of the neoplasm, and our youngest patient, who miscarried, following extreme exertion, six years before her present illness, whereas Thaler's patient aborted only four months before the carcinoma was found.

Vest, in attempting to cover the premise, and also the pronouncement of many investigators that it was less common in parous women, found that in 112 of his 132 cases, collected from the literature up to 1914, 79 had been pregnant, 73 delivering living children and 6 aborting. In trying to decide whether these patients had suffered from a prior or subsequent tubal inflammation, he found that few gave any suggestive history. The 70 per cent who became pregnant were probably free of salpingitis, or it was either unilateral or not sufficient to prevent conception, or it must have developed after delivery, which last seems improbable on the face of it. He also figures that if the primiparae, i.e., 28.4 per cent, all suffered one child sterility from a later infection, and that the sterile patients were all sterile on account of tubal inflammation, making a total of 57.7 per cent who may have had a tubal infection, this leaves 42.3 per cent of cases of primary tubal carcinoma which probably had no previous inflammation, and these we must explain on some other basis.

However, several workers, L'Esperance, Stubler, and Stanea, have



found this neoplasm associated with tuberculous inflammations of the tubes, presumably of long standing.

Ruge and Vest both draw attention to the great frequency of chronic inflammatory tubal processes,—gonorrheal, tuberculous, and postabortal,—and the distinct rarity of primary carcinoma; Cameron, in a symposium on pelvic neoplasms held by the Obstetrical and Gynecological Section of the Royal Medical Society of London, stated that he does not believe that inflammation necessarily precedes this new-growth.

Attention is drawn by many writers, namely, Goodrich, Bower and Clark, Guillemin and Marlot, to the fact that in the early cases the gross appearance was that of a mild chronic salpingitis with adherent or clubbed tubes. This has been our own experience, and it has been reported at all stages between this and large indefinable pelvic masses as described by Quin and Solomons. The lesion is most frequently found in the middle and outer thirds of the tube, often distending it with a papillomatous mass which may be accompanied by a serosanguineous or purulent fluid, and gives the tube a firmer feel than that of the hydrosalpinx or tuboovarian cyst it appears to be. It is frequently bilateral, as found by Phillips, Leuret and Leroux, Kalmann, Vest, Kuestner, Bower and Clark; Knoop and Cameron say that these constitute one-third of the cases, the tumors frequently being of unequal size. Vest's theory of transmigration of material from the end of one tube to the lining of the other, similar to the transmigration of the fertilized ovum, is attacked purely on the basis of the statement of Doran, one of the most active British investigators in this field, that the affected tube closes off the fimbrial end early, and this is used in favor of primary bilateral carcinoma by Kalmann and Schäfer.

Of the 141 cases of which we have the age, we find a majority, i.e., 50.3 per cent, occurring between the ages of forty and fifty, with the youngest reported at twenty-five years by Bower and Clark, and the oldest, Pawlik's patient, seventy years (sic Novy).

The dictum of Doran that the growth follows the line of least resistance, except that the ostium closes early, is a general description of its method of spread (Bower and Clark). Thus:

1. It may rupture the wall of the tube both by distention and due to the weakening by infiltration of the newgrowth.
2. It is frequently spread by the lymphatic stream, a broad outlet.
  - a. Toward superior lumbar group leading to metastasis to the corpus utero.
  - b. Along the external iliacs, hypogastric, and sacral glands and may involve the cervix.
  - c. Or follow the lymphatic drainage of the ovary and fundus uteri toward the kidney and back to group near aorta.
3. By contiguity, even through the uterine end of the tube to the endometrium or uterine wall, or out the fimbriated end to the ovary.

Besides the frequent metastases in the genital tract, with early involvement of the retroperitoneal lymph nodes, it frequently metastasizes to distant organs or structures. Mantel describes a case in which metastases occurred in the liver, Schweijkart one in which it occurred in the abdominal wall, Thaler in the appendix, and Kurtz in the clavicular lymph nodes. Many early cases, however, are well confined to the tube or tuboovarian mass. Cameron mentions that ascites is uncommon except with peritoneal metastasis, and Bower and Clark found a small amount of serosanguineous fluid in the abdomen in their case which showed beginning spread.

*Etiology.*—Occurring principally between the ages of forty and fifty years, though cases are reported from twenty-five to seventy years, it seems to vary little between nulliparous and parous. Cameron believes it to be as frequent in one as the other, though salpingitis may be a predisposing factor.

*Symptoms.*—These are not distinctive. An irritating clear watery discharge in a patient past the menopause, where the cervix and corpus uteri can be proved cancer-free, the last mentioned authority considers reason to suspect cancer in the tube. Many have mentioned that this discharge may be blood-stained (Andrews, Ruge), and it at times comes in gushes, as in hydrops tubae profusus. Of course, we can frequently feel a pelvic tumor which may be sausage-shaped, and Doran found a majority of the patients in his series had pain. Ruge and Heil mention that carcinomatous material may be found in the discharge from the tube or occasionally in curettings. Stanca claims that whereas ovarian carcinoma is usually bilateral, this tumor generally (66 per cent) occurs on one side, and occasionally, as in Fleischmann's case, metrorrhagia will be the principal symptom.

With regard to treatment, the opinion seems unanimous in favor of complete hysterectomy with removal of all palpable lymph nodes in the retroperitoneal groups, and Biar and the later writers recommend deep radiotherapy to follow. The prognosis is regarded as bad by almost all, though Bower and Clark report that in a collected series of 133 cases in which they had no doubts, the mortality (including cases reported to have recurrences) was 48.1 per cent, i.e., where the removal had been considered complete 40.2 per cent and where definitely incomplete 59.8 per cent.

*Pathology.*—The tumor growth is of two types, the papillary and the alveolar, the papillary being more frequent according to Sänger and Barth, and, though frequently malignant from the start, may occasionally represent a malignant degeneration in a benign papillomatous process. That the papillary type is merely an early form of the alveolar is the view of Stübler, Küsner, and Kehrér.

As regards malignancy, Lipschitz found only 4 patients out of 144 alive after four years, and his series included a number of doubtful



Fig. 1.—Case 1 (low power). Papillary carcinoma, occluding the lumen and infiltrating and destroying the walls of the tubes.

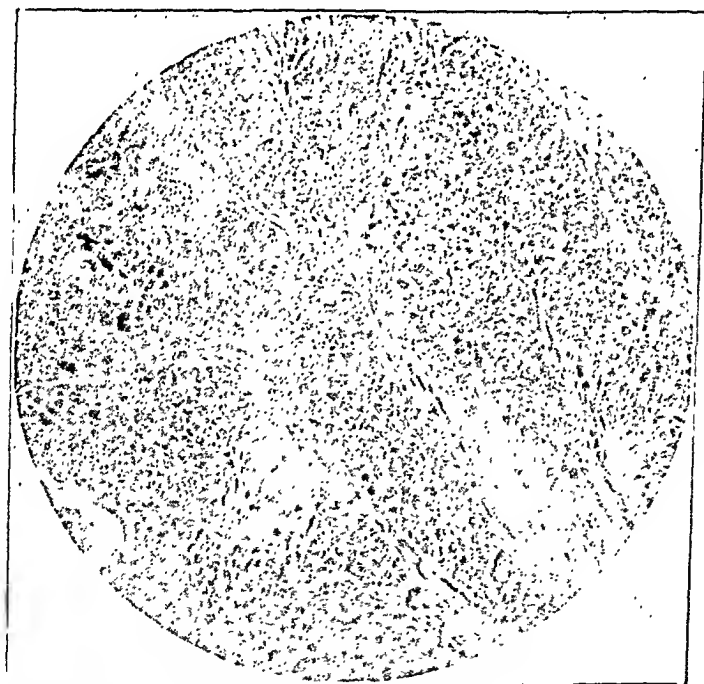


Fig. 2.—Case 1 (high power). Photomicrograph showing papillary outgrowths.

diagnoses; he regards it the most fatal of all carcinoma of the pelvic organs. Kurtz, in 1926, found only 7 cured for seven years.

On the basis that the fundus uteri is involved early rather than the ovaries, supravaginal hysterectomy is usually believed to be sufficiently radical, if all enlarged lymph nodes are cleaned out; Bower

and Clark were willing to leave the ovaries in situ in a twenty-five-year-old patient.

The uterine tubes may suffer from direct extension to the endometrium due to extension from the uterine end of the tube already involved (Thaler, Boxer, Ries, Mueller), occasionally forming a pedunculated nodule near the tubal orifice (Fabozzi, von Franque); or the lymph spaces in the uterine wall may be loaded with cancer cells as seen by Bland-Sutton and L'Esperance.

One recent case was particularly interesting because the malignant change was confined to a small area at the uterine end of the tube, and the rest of the tube on serial sectioning showed no growth. She also had amenorrhea for three months with moderate pelvic pain. None of our three patients was near the menopause.

CASE 1.—S. G., aged thirty-one, Russian widow, dressmaker, admitted to hospital July 28, 1914, with pain in right side of abdomen and in lumbar region. No previous serious illnesses, para ii, one child 10 years of age, and one miscarriage, seven years before admission. Her menstrual periods began at twelve years of age, regular every four weeks, of 3 day duration. Slight premenstrual pain. For past four months periods have been irregular. Present illness dates back to onset of irregularity in menstrual periods, during which time she has noticed a vaginal discharge and pain in lumbar region and right side of abdomen. No vomiting, fainting, or dysuria.

She had a posterior colpotomy done and left the hospital August 21, about four weeks later, unimproved. She continued to have severe pain principally in left lower abdomen and left iliac region and was readmitted November 11, 1914, complaining also of loss of sleep and weight, feeling feverish and inability to work. A foul yellow vaginal discharge was noted and her posterior colpotomy wound was still open. The fundus was not palpable, but a hard adnexal mass was felt on the left. On December 8, 1914, a laparotomy was done and part of the right fallopian tube, the entire left tube, and the left ovary were removed. In appearance the right ovary was normal; the outer end of the right tube was enlarged and appeared inflamed; the left tube and ovary were matted together in what appeared to be a much inflamed condition and were removed *en masse*. This was found to be a primary carcinoma of the fallopian tube, involving both tubes and the left ovary. She left the hospital December 25, 1914.

Her next admission was April 14, 1915, when she was found to have hard, insensitive masses in the pelvis, a cauliflower growth in the upper vagina, and a large mass connected with the fundus. She was discharged unimproved April 22, 1915, almost exactly nine months after a first admission and only thirteen months after the onset of symptoms, with a hopeless recurrence.

CASE 2.—V. C., aged forty-two, Austrian, married, occupation housework, was admitted November 21, 1914, complaining of pain in right lower abdominal quadrant, with pain on defecation and urination.

Her family and past history were essentially negative. Menstruation began at eighteen, was regular every twenty-eight days, each period lasting three days. Dysmenorrhea and comenstrual backache for past ten years, associated with passage of clots for three years. Her last period was two weeks before admission. She had had one miscarriage at six months, sixteen years previously, and no other pregnancies. She had had pain on urination and defecation for twelve or fifteen

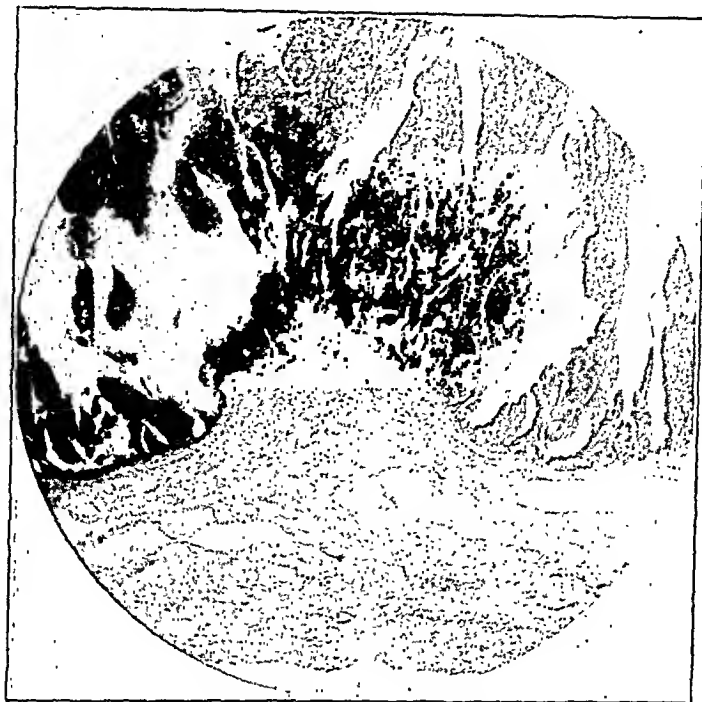


Fig. 3.—Case 2 (low power). Tumor showing papillary outgrowths into lumen of tube.

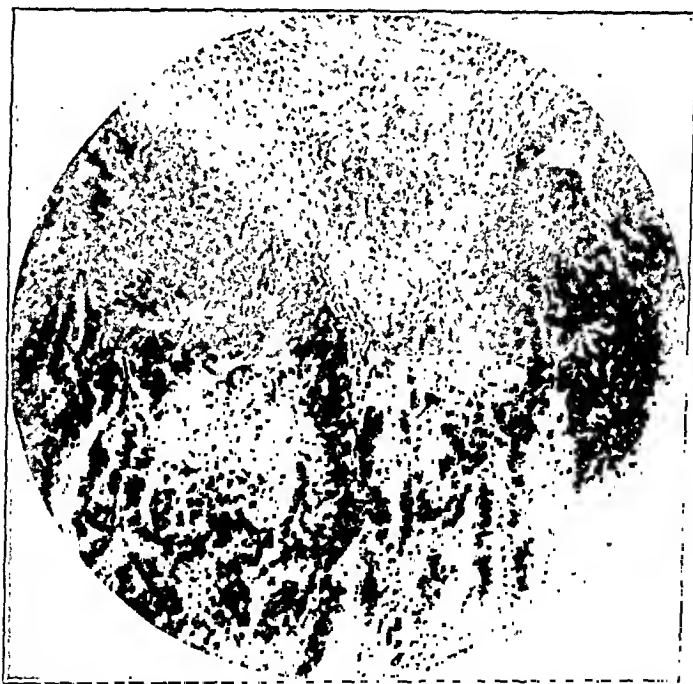


Fig. 4.—Case 2 (high power). Papillary carcinoma springing from the walls and growing into the lumen.

years. Three months previous to admission, this became aggravated and pain in her right lower abdominal quadrant developed and became continuous. She menstruated every two weeks for three months previous to admission, with lumbar backache and clots. She had lost fifty pounds in three years.

On physical examination there was nothing abnormal noted except in the pelvis. The fundus uteri was enlarged to the size of a grapefruit, especially anteriorly,

irregular in outline, one nodule on right just above symphysis pubis. At operation two days later a large fibroid was enucleated from the uterine wall. Both tubes and ovaries were much enlarged; the ovaries were cystic in appearance, and the tubes looked like large hydrosalpinges, the right being much larger. Whereas the right adnexa formed a large tuboovarian cyst, the left tube was firmly adherent in the bottom of the culdesac and separate from the cystic left ovary.

A bilateral salpingo-oophorectomy was done and the pathologic report read primary carcinoma of the tube. This patient had a negative Wassermann and her temperature, pulse, respiration, and blood pressure were within normal limits.

She was discharged in apparent good health December 10, 1914, but when readmitted on April 7, 1915, four months later, she was in very bad condition. She had marked ascites, complained of extreme weakness and emaciation, obstinate constipation alternating with diarrhea, dysuria, dyschesia, and passage of vaginal clots.

The following day paracentesis was performed and 3740 c.c. of bloody fluid were removed, revealing a large tumor mass in right adnexal region. She failed rapidly and died May 8, 1915, just six months from the time of operation and nine months from the onset of her symptoms referable to this condition.

Here we have two marked demonstrations of the futility of conservatism in this condition, with recurrence in six and nine months respectively.

In both of these cases the diagnosis was not made at the time of operation, which was also true in our third case.

CASE 3.—N. W., aged twenty-nine, married, born in Austria, occupation housewife. Admitted to hospital November 11, 1926, complaining of mild pain in left lower abdominal quadrant, and atypical bleeding for three days. She had been married ten years, had one child 9 years old, normal labor, puerperium uneventful, one miscarriage at two months in 1920 following overwork, not induced. As an adult she had influenza in 1918 and a laparotomy for appendicitis in 1922.

Menses began at age of seventeen, regular every twenty-eight days, moderate in amount, preceded by slight pain. She had no leucorrhœa or dysuria, but had noticed nocturia for five weeks. Her last menstrual period was August 23, 1926, apparently as usual. She skipped her September and October periods and had a bright red flow, moderate in amount, for three days before admission, which was preceded by slight pain in left lower quadrant.

Laparotomy three days after admission revealed a uterus normal in size, adherent to the omentum; both tubes were chronically inflamed, without much enlargement, and adherent to cystic ovaries, about six cm. in diameter, and also somewhat adherent to peritoneum of culdesac. The tubes were excised at the cornua, the round ligaments sutured to the back of the fundus uteri, and the ovaries removed. A small piece of ovarian tissue which appeared normal was implanted in the right rectus abdominis and sutured there. On discharge, November 30, 1926, her abdominal wound was healed by primary union and there was no adnexal induration or tenderness. She was instructed to return in two weeks for transfusion and radical extirpation.

Before operation her temperature was half a degree subnormal each morning, the blood count 4,900,000 erythrocytes, 80 per cent hemoglobin, 8000 leucocytes, with 65 per cent polynuclears and nearly 35 per cent lymphocytes, and she had a negative Wassermann.

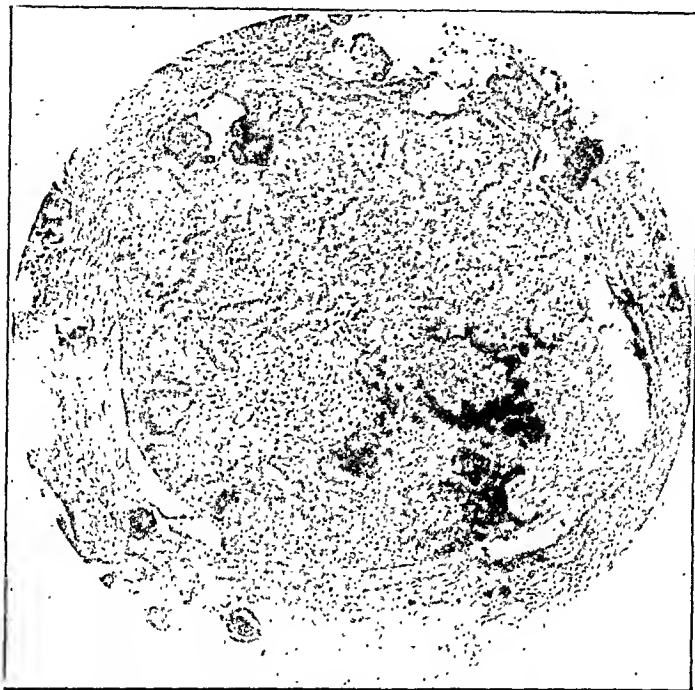


Fig. 5.—Case 3 (low power). Papillary carcinoma, with pseudoalveolar formation and areas of calcification.

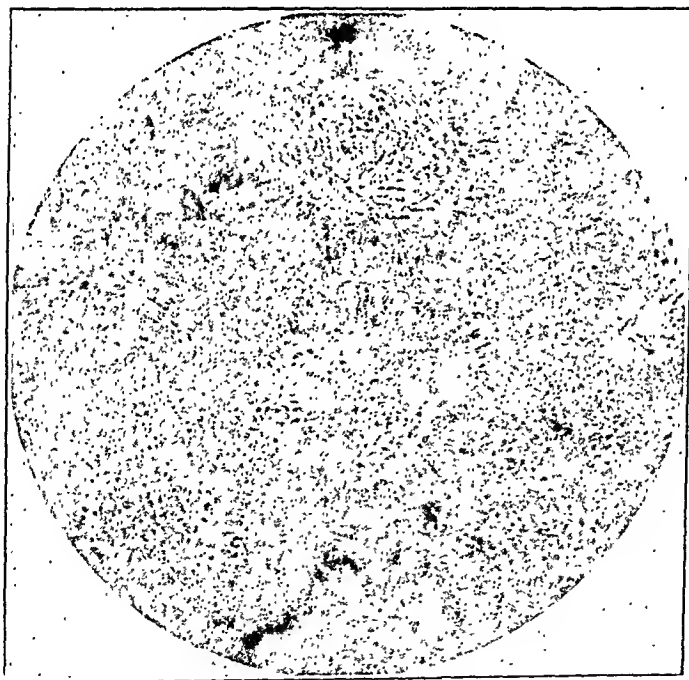


Fig. 6.—Case 3 (high power).

In this case we had the pathologic report before discharge and hope a radical operation may give a better result than in the other two.

#### CONCLUSIONS

1. Though the age incidence of carcinoma of the fallopian tubes is largely between forty and fifty, we must watch for it in all adults.

2. Grossly, it frequently cannot be differentiated from chronic inflammatory lesions if removed intact.

3. Radical extirpation, including all near-by palpable lymph glands, is the procedure recommended by most writers.

4. The frequency of this growth requires our attention in all cases of apparently inflammatory pelvic disease.

5. The diagnosis is usually established only by histologic examination.

6. Incomplete removal of the pelvic contents is not a satisfactory method of treatment of this condition.

I wish to express here my indebtedness to Drs. Symmers and Carabba of the Pathologic Department of Bellevue Hospital for their invaluable assistance.

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# IS MAGNESIUM SULPHATE INTRAVENOUSLY WARRANTED IN ECLAMPSIA? CLINICAL RESULTS VS. EXPERIMENTAL EVIDENCE

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IN a paper entitled "Studies in Anesthesia, Anoxemia, Anhydremia and Eclampsia, with Certain Deductions Concerning the Treatment of Eclampsia" (AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY, November, 1926), H. J. Stander of Johns Hopkins Hospital, comes to the conclusion that "the chemical and pathologic findings with magnesium sulphate speak against its use in eclampsia; but further work is necessary before a definite conclusion can be reached." The use of magnesium sulphate is deprecated no less than three times in the short consideration of magnesium sulphate in the rather extensive study referred to; qualified each time, however, by the statement that further experimental work must be done before any definite or sweeping conclusion can be reached.

This clinical conclusion was based entirely on experimental work on two dogs; the clinical results which had been reported from both the intravenous and the intramuscular use of magnesium sulphate being entirely ignored.

To one of his dogs Stander gave 50 c.c. 50 per cent  $MgSO_4$  solution subcutaneously and to the other 6 c.c. 50 per cent solution intravenously. As a result, he found "marked fatty changes in the liver. The section also shows numerous dilated capillaries and many spaces filled with blood. There were no, or only slight, changes in the kidneys." As to the blood chemistry he says, "The only changes observed are a lowering of the  $CO_2$  combining power and a slight increase in the blood sugar." From these observations, the above quoted conclusions were reached.

The tremendous dosage used must certainly have been toxic, closely approaching the lethal dose. In Meltzer's report of his original experiments (*Medical Record*, Dec., 16, 1905) with magnesium sulphate, he says of the intravenous injection, "If injected very rapidly, 0.1 of the salt will produce a profound toxic effect, but in a very slow injection, nearly 1.5 of the salt can be administered without any visible poisonous symptoms." And further, he says, "Larger doses of the salt are fatal also by subcutaneous injection."

The dosage used by Stander, 3.0 intravenously, is thirty times the minimum dose which if injected rapidly will produce profound

toxic effects and over twice the maximum dose which might be administered by very slow injection without any visible poisonous symptoms, according to Meltzer.

The fallacy of drawing any deductions from the effects of such a highly toxic, if not actually lethal dose in the dog and applying it to the therapeutic dosage in women, is obvious.

The clinical results reported from the intravenous use of magnesium sulphate showing a corrected mortality in one hundred cases of 9 per cent, should be given some consideration in appraising the value of the treatment. This result was obtained not only in the Los Angeles General Hospital, but the report included forty-nine cases treated by doctors outside of this hospital. Dorsett (AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY, February, 1926), using 15 cc. of a 25 per cent solution  $MgSO_4$  intramuscularly, reports thirty-eight cases, with two deaths.

In our last report (Lazard, Irwin and Vriwink, AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY, July, 1926), we included forty-five preeclamptic cases in which this treatment was used, in only six of which convulsions developed.

These cases seem to me to have an important bearing on this question; as, if this use of magnesium sulphate tends to further embarrass an organism already overloaded with toxins, as Stander seems to fear, one would expect its use to tend to increase the danger of eclampsia supervening in the preeclamptic.

One of the preeclamptic cases (Preeclamptic case No. 29) an outside case, received twenty-four injections of 20 c.c.  $MgSO_4$  each in the course of twenty-three days; she did not develop eclampsia and was delivered by cesarean section because of a placenta previa. Both mother and baby made good recoveries.

If the effect of magnesium sulphate in therapeutic dosage on the blood and liver were deleterious one would expect a patient, on a constant daily ration of intravenous magnesium sulphate for over three weeks, to show some bad effects.

#### CLINICAL CASES

In the past nine months, a number of preeclamptic cases, of both the nephritic and of the true eclamptic type, received intravenous injections of magnesium sulphate as a prophylactic against the development of eclampsia. The results have been most gratifying as none of these patients developed eclampsia.

One of these patients was admitted to the hospital nine days postpartum for medical care, a nephritic, with a history of having had abscessed teeth extracted in 1917; influenza in 1918; and a tonsillectomy and ethmoid operation. She had been pregnant five times, the first ending in an abortion at ten weeks, the second with a stillbirth at seven months, the third, a stillbirth at seven months and the

fourth with a stillbirth at eight months. During the last pregnancy she was under the care of Dr. J. M. Harris, of Los Angeles, from February until her delivery August 5, 1926. She had high blood pressure and albuminuria. In addition to the usual dietary care and bowel regulation, she received  $MgSO_4$  intravenously, every other day. She received thirty-eight injections of 20 c.c. each from June 15, 1926 until labor was induced on August 5, 1926 at the thirty-sixth week of pregnancy and resulted in spontaneous birth of a living baby. This patient as a result of her five pregnancies has one child, which, in view of her previous experience can, I think be credited to the intravenous magnesium sulphate treatment.

The clinical records of three others of these cases (Cases 1, 2 and 3), are appended to this paper, as illustrative of the clinical results we have obtained.

CASE 1.—A nephritic, was treated in two pregnancies. On her first admission she was in an eclamptic state, having had five convulsions before admission in coma. She had no more convulsions after the first injection of  $MgSO_4$  and had a total of four injections of 20 c.c. each before her spontaneous delivery of a seven months stillborn fetus fourteen days after the eclamptic attack, without any recurrence of the convulsions. She was readmitted in her second pregnancy, six months later, in her fourth month, because of a toxemia. Her blood pressure was 178/110. Under the usual dietary restrictions and with two prophylactic injections of 20 c.c. each her condition markedly improved and her blood pressure came down to 140/80. She was dismissed from the hospital to the care of City Maternity Service as an outpatient. She was readmitted December 5, 1926 at full term, with a blood pressure 200/120 and was given another course of four intravenous injections of  $MgSO_4$  before her spontaneous delivery of a full-term living baby four days after admission, no eclamptic attack occurring. It would probably have conserved the future health of this patient, a definite nephritic, to have interrupted her pregnancy and sterilized her when she came under observation with toxic symptoms in the fourth month of her second pregnancy. But, as she had no children, she desired to go on. On her admission at term, it was planned to do a cesarean section and sterilization, but she delivered spontaneously the night before the operation was to be done. She will be urged to submit to sterilization as soon as she is in proper condition, as further pregnancies would undoubtedly result in further and possibly fatal injury to her already badly damaged kidneys.

CASE 2.—This patient, also a preeclamptic of the nephritic type, was treated prophylactically for twenty days, receiving thirteen injections of 20 c.c. each, before induction of premature labor. Labor was induced because her condition did not improve and there were beginning eye ground changes. She was spontaneously delivered of a premature living child. After her delivery, her blood pressure continued high and on December 13, 1926, nine days postpartum, she was found to have a partial detachment of the right retina in the lower nasal quadrant and of the left retina in the upper nasal quadrant. Intravenous  $MgSO_4$  treatment was continued. Her vision improved and December 15, eye examination showed "both detachments much less marked, fundi clearing rapidly." She was discharged with her baby, both in good condition, on December 23, and referred to the medical clinic for further treatment.

CASE 3.—A preeclamptic of the true eclamptic type, in her thirty-sixth week of pregnancy, had sixteen prophylactic injections of 20 c.c. each, and although her general condition was apparently favorably affected by the injections, the blood pressure remained high, on two occasions reaching 210 and 212 systolic, respectively. She did not develop eclampsia and went into spontaneous labor, fourteen days after coming under treatment. A premature living child was delivered by forceps extraction. Mother and child made a rapid and uneventful convalescence.

These cases together with those heretofore reported, both of the eclamptic and of the preeclamptic type, seem to me to more than justify the continued use of magnesium sulphate, intravenously, whatever may be the immediate, and probably rapidly passing, effects on the blood chemistry.

## BLOOD CHEMISTRY STUDIES

Since reading the article by Stander, I have had some studies made to determine what, if any, the effects are on the blood chemistry of toxic pregnant women of therapeutic doses of magnesium sulphate, given intravenously. Table I shows the results of this study in three cases, ten of the readings being "before and after" the intravenous use of  $\text{MgSO}_4$ .

TABLE I. EFFECT ON BLOOD CHEMISTRY OF  $\text{MgSO}_4$ , INTRAVENOUSLY IN THERAPEUTIC DOSAGE

CASE	DATE	SUGAR	N.P.N.	PREFORMED CREATININ	URIC ACID	$\text{CO}_2$ COMBINING VOL. PER CENT	REMARKS
1 Nephritic Eclampsia 1st Preg.	12-26-25	166	50	2.5	7.2		4 injections of 20 c.c. each in interval.
	1- 7-26	100	50	1.6	4.0	38.0	
	12- 7-26	90	27	1.2	4.0	45.3	
Nephritic Preeclampsia 2nd Preg.	12- 8-26						Had breakfast after first blood taken.
	Before $\text{MgSO}_4$	69	31	1.4	3.7	61.4	
	After	125	35	1.1	2.5	48.1	
2 Nephritic Preeclampsia	11-16-26	77	40	1.5	4.4		Breakfast after first blood taken.
	12- 4-26	79	51	1.5	4.6		
	12- 8-26						
	Before $\text{MgSO}_4$	89	33	1.2	3.2	63.3	
	After	92	30	1.1	2.5	62.4	
3 Preeclampsia True	12-10-26						Fasting.
	Before $\text{MgSO}_4$	90	27	1.1	3.0	48.1	
	After	80	27	1.1	2.6	48.1	
	12-11-26						
	Before $\text{MgSO}_4$	69	22	1.3	3.5	46.2	
	After	75	22	1.3	3.2	46.2	
	12-13-26						Fasting.
	Before $\text{MgSO}_4$	79	30	1.5	3.0	42.4	
	After	80	30	1.5	2.9	42.4	

The first case charted in the table, was the Case 1 above. The reading of Dec. 26, 1925 was taken on her admission in her first pregnancy, in an eclamptic state; the reading of Jan. 7, 1926, eleven days after she recovered from her eclampsia but while still undelivered and quite toxic. These readings were without relation to ingestion of food. The only treatment she had received, other than regulation of diet and bowels, was four injections of 20 c.c. of 10 per cent  $\text{MgSO}_4$ . While these readings do not show the immediate effects on the blood chemistry of the magnesium sulphate, yet we find associated with a marked clinical improvement,

an actual decrease of the blood sugar from 166 to 100 mg. per 100 c.c. the N. P. N. remaining constant. A marked decrease in the preformed creatinin, a considerable decrease in the uric acid. Unfortunately there was no  $\text{CO}_2$  combining power estimation in the first blood analysis. On her last admission in her second pregnancy at term, with a blood pressure, 200/120, usual urinary changes, but not in an eclamptic condition, she received an injection of  $\text{MgSO}_4$  on Dec. 5, 1926 and two injections on Dec. 6, 1926, her blood pressure falling to 154/106 on Dec. 7, 1926; on which day her blood chemistry taken without regard to her food intake was sugar 90, N. P. N. 27. Preformed creatinin 1.2, uric acid 4.0,  $\text{CO}_2$  combining power, 45.3 vol. per cent. On Dec. 8, 1926, we attempted to get a "before and after"  $\text{MgSO}_4$  blood reading, while she was fasting, but a nurse by mistake gave the patient her breakfast after the first blood was taken. The chart shows a considerable increase in the blood sugar, 56 mg. per 100 c.c., due to food, and a decrease in  $\text{CO}_2$  combining power.

The second case whose blood chemistry values are charted, is the second case above reported, also a nephritic preeclamptic. The first two readings were without relation to food intake or to  $\text{MgSO}_4$  injection although she had had thirteen injections in the eighteen days interval between the two readings. There was no improvement in her condition, so her pregnancy was terminated. There was no appreciable change in the sugar; the N. P. N. increased markedly. A "before and after  $\text{MgSO}_4$ " reading four days after delivery, showed no appreciable change.

The third case charted, a preeclamptic of the true eclamptic type, whose clinical record is not here reported, had a series of three "before and after  $\text{MgSO}_4$ " readings. Here too, as can be seen from the table the variations were negligible, entirely within the range of technical error. The  $\text{CO}_2$  combining power showed absolutely no change "before and after" although there was a decrease from 48.1 to 42.4 vol. per cent in the course of the three days of observation. As her toxemia showed no improvement, although eclampsia did not develop, her pregnancy was terminated. Whether the slight drop in the  $\text{CO}_2$  combining power was entirely due to her persistent and possibly increasing toxemia, or was partly caused by the  $\text{MgSO}_4$  injections is a question which cannot now be determined. Dr. Maner, the hospital pathologist, to whom I am indebted for the chemical blood analyses, is now undertaking an investigation as to effects of therapeutic doses of  $\text{MgSO}_4$  on the blood chemistry, on a series of toxic cases, controlled by blood examinations of toxemic cases not so treated.

The results here reported would tend to show that the intravenous use of therapeutic doses of  $\text{MgSO}_4$  does not have any immediate bad effects on the blood, while its continued use in the one eclamptic (nephritic type) showed a marked reduction in the blood sugar, creatinin and uric acid coincident with the clearing of the active eclamptic condition.

There have been too few readings to draw any final conclusions as to the effects on the blood chemistry; but taken in conjunction with the clinical results which have now been reported, amounting to approximately two hundred cases (intravenous and intramuscular use) in which the number of injections must closely approximate one thousand, would point toward the conclusion that the use of  $\text{MgSO}_4$  is not only warranted but indicated.

The pathologic changes, as a result of  $\text{MgSO}_4$  injections, Stander found to be "marked fatty changes in the liver and numerous dilated

capillaries and many spaces filled with blood. There were no, or only slight, changes in the kidneys." These changes are, admittedly, not similar to those found in eclampsia, but if such an effect on the liver were produced by therapeutic dosage, it would, because of added damage to an already injured organ, certainly speak against this use of magnesium sulphate. I had thought that it would not be possible to meet this objection, as we have had no fatal case for several months. A case seen by me in consultation, with Dr. H. L. Davis, Huntington Park, recently, one of acute fulminating eclampsia, has furnished some evidence of the effects on the tissues of intravenous  $MgSO_4$  in therapeutic dosage. The clinical record of the case is appended to this paper (Case 4).

CASE 4.—This was an acute fulminating case of intrapartal eclampsia, which was delivered spontaneously of a living child five hours after her first convulsion. When I first saw the patient at 11:45 A.M. she had had two convulsions (the last



FIG. 1.—Kidney in case of acute fulminating eclampsia, acute tubular nephritis, tubules choked with blood and albuminous material. (x80.)



FIG. 2.—Section of liver from acute fulminating eclampsia, showing small area of normal liver, upper right; large areas of necrosis in some of which periportal origin is evident. (x80.)

one at 9:45 A.M.), was still comatose and at the termination of the second stage of labor, the caput appearing in the vulva with the pains. Delivery was rapidly completed under gas anesthesia by fundal pressure. She had had two injections of  $MgSO_4$ . She had another convulsion at 3:45 P.M. and one at 12:15 A.M., Nov. 20, 1926 and the  $MgSO_4$  was repeated after each one of these convulsions. She had no more convulsions for forty hours until Nov. 21, 4:25 P.M., when the attack was apparently precipitated by an intravenous injection of caffein sodium benzoate which was given in the hope of stimulating the patient who was very low and also in an attempt to increase the kidney action. The last convulsion at 10 P.M. (Nov. 21) also followed immediately upon another intravenous injection of caffein sodium benzoate. The urinary output was extremely scant there being only six ounces of bloody urine obtained between 7 A.M. and 9 P.M. (Nov. 19); a dry catheterization at 2 A.M. and 6 A.M., to be followed by three drams at 10:30 A.M., four drams at 4:30 P.M., one ounce at 10:30 P.M. (Nov. 20, 1926), and one ounce at 2 A.M., two and a half drams at 6:30 A.M.; three drams at 11:30 A.M., three drams

at 4:40 P.M. and one dram at 9:30 P.M. (Nov. 21), and no more up to the time of her death, a total of ten ounces of bloody urine in the seventy-two hours elapsing between her first convulsion and her death. (Bladder empty at autopsy.)

The clinical observations are explained by the autopsy findings. Both kidneys presented a very extensive acute hemorrhagic nephritis, the tubules being fairly choked with albuminous material and blood cells, as can be seen in Fig. 1. The liver showed an extensive hemorrhagic necrosis, a few fields showing it to be definitely periportal, typical of eclampsia; but in most fields the necrosis is so diffuse that its origin cannot be determined. Dr. Zeiler's explanation is that the entire lesion was an eclamptic one, but the liver injury was so overwhelming that it spread throughout the liver substance. (Fig. 2.) This opinion is concurred in by Drs. Walter Brem and Roy Hammock, Dr. Zeiler's associates, who kindly looked over the slides for us. Dr. Zeiler also made a special fat stain to see if this patient, who had received seven injections of 20 c.c. each  $MgSO_4$ , presented fat deposits in the liver such as described by Stander as having been found in his dogs. Fig. 3 shows no fat globules in the liver.

The brain is interesting for in the presence of an almost complete anuria with extensive and practically total destruction of kidneys and liver, it was relatively dry. The patient's surface edema showed no diminution but rather slightly in-

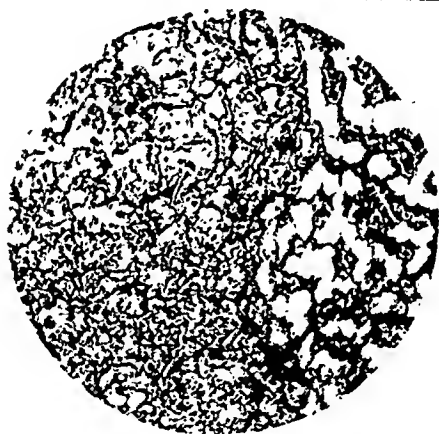


Fig. 3.—Section from same liver (Sudan III stain) shows relatively normal liver cells on right; diffuse necrosis to left; an occasional vacuole but no definite fat droplets. (x300.)

creased up to time of her death. This apparent lack of dehydrating effects of the  $MgSO_4$ , can be explained, I believe, in view of the autopsy findings, by the assumption that the dehydrating effects of  $MgSO_4$  are exerted first on the brain, and as there was no outlet through the kidneys, which were blocked, the surface edema remained uninfluenced. On the afternoon of Nov. 21, 1926, we considered the advisability of resorting to decapsulation by Edebohl's method but decided against it. The kidney findings show I believe, that this or any other therapy would have been unavailing. This, then, is one of the fortunately very rare cases of acute fulminating eclampsia which so overwhelm the patient that no present known therapy is of avail.

In the face of the clinical results which we have obtained and heretofore reported, and which others have duplicated, we are told that our practice "seems dubious" and that "the use of magnesium sulphate to control the convulsions is not warranted" because two dogs which had been given overdoses "had marked fatty changes in the

liver" and there was observed "a lowering of the  $\text{CO}_2$  combining power and a slight increase in the blood sugar." It is unfortunate that this simple procedure which has shown such encouraging clinical results should be discouraged on the basis of such scant evidence.

The study here presented was undertaken in the hope of learning if the same changes which take place in the dog from toxic doses take place in the woman where therapeutic doses have been used.

#### CONCLUSIONS

1. Chemical and pathologic findings indicate that in therapeutic doses, magnesium sulphate intravenously does not exert any deleterious action on the blood, nor produce any pathologic changes in the liver, but on the contrary in the active eclamptic, by a relief of the toxemia, has a beneficial effect on the blood. The one pathologic report here made demonstrates the dehydrating effect in the brain.

2. Further clinical experience with intravenous magnesium sulphate has but increased my confidence in its efficiency.

3. The experience of the past two and a half years of its use in the preeclamptic has demonstrated its value as a prophylactic measure in these cases. This does not mean that all cases can be carried to term without eclampsia supervening. There are many cases where pregnancy has to be terminated, especially those of the nephritic type, as is illustrated by many of the cases which we have heretofore reported.

4. No claim has ever been made that this treatment is in any sense a specific nor that with it one can expect 100 per cent success. But I do believe that, with a careful observation of cases and with the aid of  $\text{MgSO}_4$  intravenously, the incidence of eclampsia can be further reduced and the mortality of eclampsia should be less than 10 per cent, and with the further development of this therapy a mortality of less than 5 per cent is not too much to expect.

I am indebted to Dr. G. A. Maner, pathologist of the Los Angeles General Hospital for the blood analyses and to Dr. A. H. Zeller for the autopsy and pathologic report as well as for the microphotographs.

2007 WILTSHIRE BOULEVARD.



# THE TREATMENT OF OBSTRUCTING RECTOVAGINAL ENDOMETRIOSIS

BY WILLIAM P. GRAVES, M.D., BOSTON, MASS.

AT a meeting of the American Gynecological Society held in May, 1925, I reported a case of obstructing rectovaginal endometriosis<sup>1</sup> successfully treated by hysterectomy and by removal of the ovaries combined with a temporary colostomy. The patient, moribund at the time of the operation on account of gradual and finally complete obstruction of the bowel, recovered from the operation and eventually regained normal function of the rectum as a result of atrophy and resorption of the pelvic mass. On the basis of the results in this case I recommended hysterectomy and ablation of the ovaries in the treatment of obstructing rectovaginal endometriosis in preference to the radical operation formerly advocated by Dr. Cullen. This method of treatment has not met with entire approval on the part of some writers whose criticism appears to be based on theoretic grounds rather than on those of actual experience.

In order to substantiate the statements and recommendations made in the earlier paper two other similarly treated cases are herewith presented, one from my practice and one from that of Dr. John A. Sampson, who has kindly contributed his notes for inclusion in this report. The original case is repeated in detail with the special purpose of reporting the present condition of the patient two years and a half after the operation and is as follows:

CASE 1.—The patient, a single woman of forty, in apparently good health, consulted me in October, 1923, for rectal pain at the time of her menses. Four years previously she had been examined by a prominent general surgeon, and by a rectal specialist, both of whom had made a diagnosis of inoperable cancer of the rectum. Since then she had continued her work as a private secretary and had suffered no especial impairment of health. My examination revealed a large abdominal tumor reaching above the umbilicus. There was an extensive induration of the pelvis which caused a nonulcerated stricture of the rectum through which the finger could be passed with difficulty. I also diagnosed the case as probable cancer combined with a uterine or ovarian tumor, though I was puzzled by the excellence of the patient's physical condition. On account of the doubtful diagnosis, an exploratory laparotomy was advised, and arranged for, but the patient did not appear. Nine months later, July, 1924, she again consulted me, this time for obstruction of the bowels. She was greatly changed in appearance, much emaciated, and enormously distended. The abdominal tumor had markedly increased in size, and the stricture of the rectum was nearly complete. She was taken immediately to the hospital where the distention of the bowels was relieved with great difficulty.

<sup>1</sup>Graves' Relationship of Ectopic Adenomyomas to Ovarian Function, AM. JOUR. OBST. AND GYNEC., November, 1925, x, No. 5.

Under anesthesia the abdominal tumor was definitely made out to be a fibroid. The induration of the pelvis hopelessly involved the rectum, cervix, and upper vagina. A specimen was removed from an ulcerated area of the vaginal fornix, which on microscopic examination proved to be typical endometrial tissue. With the diagnosis thus made the aspect of the case was instantly changed. Although the patient was in extremis, the abdomen was opened a few days later, and a rapid supravaginal hysterectomy was performed with a removal of both ovaries. In one ovary there was a small nonadherent chocolate cyst. The colon, now completely obstructed, was colossal in size. A pucker of the gut wall was drawn up through and fastened into a stab wound through the left rectus muscle, and a glass Mixer tube placed in the bowel. The patient survived the operation and immediately began to improve in health as a result of the relief derived from the colostomy. For weeks the expected regression of the pelvic mass was watched for in vain. Finally, in about five months a perceptible softening and diminution in the size of the mass appeared, and the patient began to have partial movements through the natural channel. Improvement then became more rapid. The colostomy opening was allowed to close seven months after the operation, and the patient was discharged in excellent health on February 22, 1925.

When seen on April 15, 1925, she was in perfect health, having regained her normal weight and strength. She was having normal movements of the bowels with the help of a single daily dose of mineral oil. Examination still showed some thickening and induration in the paracervical and pararectal tissue, but there was marked diminution in its extent and hardness.

When last seen, January 25, 1927, the patient stated that she was in perfect health and that for many months her bowels had been moving daily without cathartics. Examination showed some atrophied nodular relics of the former tumor mass that filled the pelvis. The cervix was no longer involved and was movable. There was still a partial stricture of the rectum, but the lumen was sufficiently patulous to give no trouble.

CASE 2.—Mrs. R. First seen August 16, 1926. The patient was thirty-eight years old, had been married twelve years, and had had a child born dead, one year after marriage. At her delivery she had received a tear through the sphincter and muscle which was later successfully operated upon.

For two or three years she had noticed a small amount of bleeding between her periods. Of late there appeared to be some obstruction to defecation which she ascribed to the results of her former sphincter operation. This was particularly noticeable during the catamenia.

At the time of consultation there was almost complete obstipation, the patient having been unable to move her bowels for several days previous. Diagnosis of the attending physician was cancer of the rectum. The patient's general appearance was that of robust health. Pelvic examination revealed an ulcerated area in the posterior vaginal fornix which bled easily. The lower pelvis was filled with a hard infiltrating mass that immobilized the cervix and involved the rectum. The lumen of the rectum at about three inches from the anus was constricted by the mass to a size that would just admit the tip of the forefinger. There was no ulceration of the rectal mucous membrane. A diagnosis of rectovaginal endometriosis was made, and the patient anesthetized for proof by biopsy. Tissue removed from a deep incision in the posterior fornix directly into the mass revealed typical endometrial glands. The stricture of the rectum was dilated with long flexible metal bougies. The situation was explained to the patient and consent granted for a hysterectomy with a possible colostomy. The stretching of the rectal

stricture relieved the patient's obstipation to such an extent that she did not report for operation until two weeks later. The operation performed on September 4, 1926, consisted of a supravaginal hysterectomy with removal of the adnexa. There were many dense adhesions in the posterior culdesac, but no chocolate cysts or other endometriomas were found. No attempt was made to extirpate the dense board-like mass surrounding the rectum and infiltrating the deep cellular tissue of the pelvis. As the stretching of the rectal stricture had given the patient immediate relief it was decided that a colostomy was unnecessary. The recovery was uneventful, the bowels moving readily with catharsis. The patient reported for examination on December 13, 1926. She was in excellent health, the bowels being regulated by mild cathartics. Examination showed the mass in the pelvis to be reduced about one-half. There was still some stricture of the rectum, but the deep constricting ring of tissue was softer and the lumen considerably larger. The pelvic mass is behaving in this case exactly as it did in the first case, and if it continues to do so, it will undergo further marked diminution in the next six months.

CASE 3.—I am greatly indebted to Dr. Sampson for the report of the following case. It is of especial interest since the treatment adopted was based on the results of Case 1 recorded above. The report is transcribed verbatim from Dr. Sampson's personal letter:

"November 12, 1926. I saw Mrs. A. P., aged forty-one first in March in this year. She had one child in 1912 and a miscarriage in 1917. Menstruation was regular, without much pain, and a moderate flow. The last flow occurred four weeks before I saw her.

"Her chief complaint was marked constipation at the close of the menstrual period. She stated that it began in January of this year and was increasing in severity. She told me it took from 7 to 10 days to recover from this constipation. There was no marked pain associated with it, but her abdomen became greatly distended.

"On examination I found marked induration of the culdesac, extending down the rectovaginal septum. On rectal examination this induration could also be definitely determined. There was no difficulty in making a diagnosis of the condition present.

"She was operated upon on March 9, the second day of her menstrual period. At the time of the operation the entire anterior culdesac was found to be obliterated by the fusion of the uterus to the bladder, due to peritoneal endometriosis in that situation. Both tubes and ovaries were apparently normal, and there was marked invasion of the culdesac fusing the sigmoid to the posterior surface of the cervix. The sigmoid was greatly distended to two or three times its normal size. I removed the appendix, both tubes and ovaries, and the entire uterus and portion of the vagina and made a temporary colostomy by bringing up the loop of the sigmoid to the anterior abdominal wall on the right side through a split muscle incision. A rubber tube was inserted in the large intestine. She had as a post-operative complication a bronchopneumonia which I think might have been due to dissemination of endometrial tissue into the lungs. She recovered from this and left the hospital with her bowel evacuations moving both through the colostomy wound and also through the rectum.

"I saw her on May 14 and the colostomy wound was nearly closed and her bowels were moving practically entirely through the natural channels. She was seen again in July and the colostomy wound was entirely closed. At the time of both examinations there was still marked induration in the anterior rectal wall and also on either side of the rectosigmoid. I saw her for the last time today. She feels well, has gained in weight, the bowels move naturally, but the induration in the

culdesac still persists but has not increased in amount. Symptomatically she is free from any trouble. A very interesting feature of the histologic study of the specimen removed was that a good bit of the endometrial tissue was of definitely metastatic origin as shown by serial sections of these areas."

### CONCLUSIONS

1. Since endometriomas of all kinds reproduce both histologically and physiologically the uterine mucosa, it is reasonable to suppose that unless it has undergone malignant change the tumor tissue like that of the normal mucosa should become atrophied after cessation of ovarian activity. I have noted this behavior in cases where discrete palpable endometrial tumors had been left in the posterior culdesac after supravaginal hysterectomy.

2. The method of treatment suggested by these three cases is simple of execution and safe for the patient as compared with the formidable operation required in extirpating the growth.

3. Temporary colostomy should be employed in severely obstructed cases until the constricting mass about the rectum is sufficiently atrophied or resorbed to permit of the normal function of the bowel. A colostomy performed after the manner described in Case 1 will close spontaneously in a few days after removal of the glass drainage tube.

4. The indurated mass in the pelvis does not entirely disappear, but diminishes greatly in size, and gives no symptoms.

198 COMMONWEALTH AVENUE.

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Doerfler, H.: Spurious Pregnancy. *Monatsschrift für Geburtshilfe und Gynäkologie*, 1925, lxxviii, 290.

On the basis of four cases observed by him and the 133 cases reported in literature the author believes in Nassauer's definition, that spurious pregnancy implies a condition in which a woman believes herself pregnant, feels life and maintains that the child is growing although she is not pregnant. The author believes that the cause of pseudocyesis is hysteria. On this assumption may be explained the morning vomiting, amenorrhea, and the supposed enlargement of the breasts. The abdominal enlargement may be due to aerophagy, variation in tonicity of the diaphragm and abdominal muscles, and flatulence. The increase in weight may be due to the increased rest and intake of food to which the patient resorts when she believes herself to be pregnant. From the legal standpoint, pseudocyesis is important because of the possible charges of murder of the newborn, criminal abortion, or substitution of another child.

J. P. GREENHILL.

# THE EMOTIONAL LIFE OF WOMAN IN RELATION TO THE PRACTICE OF GYNECOLOGY\*

BY DONALD MACOMBER, M.D., BOSTON, MASS.

THIS subject demonstrates the extraordinarily close connection between mental states and the function of various organs. The connection has, of course, always been recognized. It is one of particular importance in relation to the pelvic organs partaking, as they do, in such an intimate manner in the emotional life of the individual. Since the symptoms which arise from disordered function of these organs are the same, whether the cause is of local, constitutional or emotional origin, it is imperative to be able to recognize the cases where they do not come from definite pathology. It is easy to feel that certain symptoms are always associated with certain diseased conditions, but often disastrous from the point of view of the patient who fails to get relief from operative or other forms of treatment directed solely to the removal of purely local conditions.

I propose, then, to discuss this important subject in a quite informal manner, illustrating some of the points by cases from actual practice. But before beginning this discussion, it is necessary to define what I mean by emotional states, and to review briefly the mechanism by which they produce the local symptoms to which I have referred.

There is no question but that sudden strong emotions such as extreme fear or anger may have visible effects upon the reproductive organs of the woman. This is, of course, obvious with sex emotion. These effects, however, are fleeting and, if the emotions are not constantly repeated, have no permanent effect. It is the more chronic emotions, if I may be permitted to use this term, which because of their very nature do produce sufficient effect to cause the development of actual symptoms. A chronic state of fear, grief or worry is often enough in the susceptible individual to produce such marked effects that they are often mistaken for actual disease. Other mental states which are less commonly regarded as harmful may also produce changes. Unhappiness, particularly if it be marital unhappiness, is a common cause of trouble, and I believe that in certain women there is a kind of mental tension which is often responsible for the development of some of these conditions. The symptoms which are produced may be of extraordinary variety. They include all of the more common ones so well known to the gynecologist, such as menorrhagia, dysmenorrhea, amenorrhea, bearing down and dragging sensations, backache, fatigue, leucorrhea and urinary frequency. Other

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\*Read at a meeting of the Brooklyn Gynecological Society, December 3, 1926.

systems besides the pelvic organs may be involved in the symptom-complex, and there may be headache, insomnia, indigestion, even nausea and vomiting, rapid heart beat or constipation. The state of nutrition may be affected and there is loss of weight, or a failure to be able to gain weight up to what should be normal for the individual height and age. As I have said, these symptoms are not accompanied by the evidence of actual pelvic disease, but there may be signs which to the critical eye will suggest that the origin is to be sought elsewhere than in the pelvis itself. Locally the most frequent sign is that of chronic passive congestion,—redness of the cervix, profuse though otherwise normal cervical secretion (a condition interpreted by the patient as leucorrhea), fullness about the uterus which often approaches the softening seen with early pregnancy, and ovarian tenderness where the evidence of disease is lacking. It is not uncommon to feel actively pulsating vessels. In general, however, the thing that should make the practitioner suspicious that he is dealing with a functional derangement of emotional origin, rather than with a case of organic disease, is the contrast between the number of symptoms of which the patient is complaining and the absence of any signs of pelvic disease.

There is a dearth of accurate knowledge of the manner in which these symptoms are caused by the emotions which precede them. We know, of course, that the sympathetic nervous system which innervates the pelvic organs is in some vital manner concerned with the emotional life. You are all familiar with the James-Lange theory of the emotions, that we feel certain emotions because certain changes have been produced in the organs; for instance, we feel fear because our faces are pale, our pupils are dilated, our mouths are dry, our skin is covered with cold perspiration and our hearts are beating rapidly. Be this as it may, it is a fact that emotional states are intimately bound up with changes of a functional nature in various internal organs. These changes are produced through the sympathetic nervous system. They are changes in function which are ordinarily not under the control of the will. Every organ in which smooth muscle or gland tissue plays a part, including all the blood vessels and all the organs which have a secretion, whether external or internal, are supplied with fibers from the sympathetic nervous system. Emotional states may, therefore, cause symptoms in any of these organs. The common pelvic symptoms are caused by changes in the circulation which produce a chronic passive congestion. It is not unlikely that most of the disturbances of menstruation and ovulation which do not have a definite pathologic origin are of this nature and arise from this congestion. There is, however, another way in which emotions produce their effect upon the pelvic organs, namely, through disturbances in the production of the various hormones. It is well known

that there is a close interaction between the thyroid, pituitary and ovarian secretions. It is extremely probable that the adrenals and all the other glands having an internal secretion also partake in this interaction. If for some reason which we do not understand an emotional state produces certain effects upon one of these secretions it is apt to throw the balance of the others out of adjustment and produce symptoms. A case in point is the occurrence of hot flashes after removal of the ovaries. These symptoms are circulatory in origin and are called forth because the ovarian hormone no longer balances the internal secretions of the other glands. Patients universally state that hot flashes are more frequent if they are worried, fatigued or otherwise emotional.

Having thus taken a preliminary survey of the field let us now turn to a discussion of some of the actual instances in which emotional states have been known to cause symptoms of a gynecologic nature. Instances of this sort are undoubtedly well known. Many of them are described in textbooks on gynecology, but for some reason or other none of the authorities have collected their cases in such a way as to be an adequate presentation of the subject. The present paper makes no claim to any such purpose, the aim is merely a suggestive one in recalling to your minds how important the subject may be. No case should ever be questioned or examined without having in mind the possibility that any, or all, of the symptoms may have an emotional background. For convenience the subject is treated purely from a symptomatic point of view, and the presenting symptom is taken as a means of classification. Many cases fall under several headings, but in general there is one symptom which will dominate all the others, and it is usually this one which causes the patient to consult the physician. A word of caution is necessary at this point, however. Sometimes a false modesty, or a feeling of shame, will prevent the patient from revealing the true state of affairs at the first visit. This is particularly true if the trouble is something like masturbation or failure of coitus.

In general the symptoms fall under three headings, namely, those which indicate a disturbance of menstruation, those which have to do in some way with the relation between the sexes, and those which appear during the course of pregnancy, and it will perhaps be just as well to take them up in that order.

First, then, those symptoms which have to do with menstruation. Perhaps the most common is that of dysmenorrhea. That symptom may often have a background of displacement, anteversion or tumor. The vast majority of cases, however, do not show any marked pathologic lesions. Close questioning will usually reveal the fact that when the periods first appeared they were painless, and that the dysmenorrhea was a matter of gradual onset. Most such cases will also give a

history of mental or nervous overwork in the critical days when the habit of normal menstruation should have been formed. Perhaps the chronic state to which I have referred as a mental and nervous tension is more than anything else responsible. That this may be so is shown by the fact that cases are known to develop as a result of marital unhappiness.

A typical case (5041) is that of a seventeen-year-old high school girl whose periods began three years ago, always somewhat painful, but getting progressively worse during last year, so much so that morphine had been employed. Social history showed that she had been working hard preparing for college, had been also very active socially and had been taking part in dramatic plays. It was the severity of the period which had forced the parents to secure medical advice. Patient was seen in collapse resulting from severe pain caused by emotional strain of appearing in a play the previous night at beginning of catamenia.

To illustrate dysmenorrhea arising from marital unhappiness let me quote the case (5580), of another woman of thirty-one years of age who consulted me for sterility after six years of marriage. She had always had a little dysmenorrhea but nothing of any great amount until after her marriage. Since that time the pain had become steadily worse in spite of three operations. The examination was completely normal, and it was only after cross-examination that it was discovered that the appearance of every monthly period meant an emotional crisis, partly caused by marital unhappiness and partly the result of the failure to become pregnant.

Menorrhagia is a gynecologic symptom which may also be produced by emotional conditions. This is well illustrated by the case (5692) of a thirteen-year-old school girl, complaining of extreme menorrhagia, so much so that she sometimes only had seven to ten days in the month during which she was free from flowing. Examination was entirely negative, and the trouble seemed to be entirely a social one. Her mother stated that in addition to carrying on the work of junior high school last year, which kept her busy from rising in the morning until after three in the afternoon with no adequate noon meal and which required two or more hours' study in the evening, she was taking elocution, dancing and piano lessons and going to numerous evening parties.

Another case (5262) is that of a twenty-five-year-old single woman who came in complaining of pruritus, menorrhagia, leucorrhea and nervousness. Pelvic examination showed nothing but congestion. The real trouble proved to be masturbation, and there was complete relief with depletion and advice.

This particular symptom of menorrhagia is practically always associated with pelvic congestion, but the congestion may result in different ways. This is shown by (5476) the case of a woman of thirty-seven, married sixteen years, with four children, complaining of leucorrhea, dyspareunia, menorrhagia, etc. Her trouble began with the six months' illness of her husband and had been continued by the fear of pregnancy. She experienced much relief from depletion and advice in regard to birth control.

Another patient (5126) was a married woman of thirty-eight, with three children. She came in because of menorrhagia and intermenstrual bleeding. The examination was negative except for congestion. There was nothing in her history to suggest a cause except a state of chronic fatigue from constantly living beyond her strength. As soon as she lived a more normal life and after depletion her symptoms straightened out.

Irregular or scanty menstruation amounting even to complete amenorrhea is well known as the result of grief, or homesickness. Many young girls are subject to amenorrhea when they first go away



to school, apparently from the latter reason. A change into strange surroundings will often produce this result. Note the effect of coming into this country often seen with green immigrant girls. The fear of pregnancy will sometimes cause an amenorrhea which will simulate pregnancy in every way.

A case in point is that of (3282) a married woman of forty-two with two children, who came in having skipped two periods much afraid she was pregnant. Examination showed nothing but congestion. When the patient was assured she was not pregnant, her period came on within a few days and her symptoms disappeared.

A similar case (4780) is that of a married woman of forty-five, with two children, who having gone over ten days presented all the symptoms of pregnancy. She was extremely nervous and apprehensive, but when told that she was almost certainly not pregnant, menstruation started that night and her symptoms disappeared.

These are not isolated instances and are probably extremely common with a certain type of woman early in the changes at the time of the menopause. Usually, however, the fear of pregnancy does not result in amenorrhea, but in pelvic congestion alone. This type of case is very common and often appears where the economic factor makes further pregnancies a matter of dread.

Such a case is that of (5523) a married woman of thirty-five with four children on a professor's income, who to avoid further pregnancies attempted to practice continence, or whose husband practiced withdrawal. Intense pelvic congestion resulted together with various referred symptoms. Advice as to a more physiologic method of preventing conception gave her complete relief.

Occasionally amenorrhea occurs in young people of an intensely emotional character and there is subsequently found to be a disturbance of an endocrine nature. It is hard to say which of these conditions arises first; the chances are that they both are caused by a previous emotional unbalance in cases of this particular sort. I do not mean, of course, to imply, for instance, that all cases of low thyroid and scanty or absent menstruation are of purely emotional origin.

Cases of this sort are illustrated by (5508) a young girl eighteen years of age who had never had periods. While there were certain things which were not quite normal, such as slight anemia and poor nutrition with low blood pressure, the chief cause seemed to be intense mental and nervous activity due to competition in studies both before and during college. Her periods appeared before the physical conditions had been corrected merely after a change in schedule. This patient also apparently had a pituitary disturbance, but it is felt that that condition had probably arisen secondarily to the emotional strain under which the patient was living.

Another case of amenorrhea with emotional and later endocrine background is that of (5619) a married woman of thirty-three, married eight and a half years, complaining of sterility and periods of amenorrhea. This patient began menstruating at fourteen, was normal for six months, after which she was sent abroad for a year, during which time there were no periods. Periods were normal until she became engaged at the age of seventeen. During this time there was much sexual excitement and a good deal of unhappiness. The periods became very irregular, the engagement was terminated at twenty. At the age of twenty-three after a severe emotional crisis, she developed menorrhagia and metrorrhagia. She was married in

1917 and her husband was taken prisoner during the war. For the past year she has had further trouble of an emotional nature with another man. Recently her periods have only come once or twice a year and her metabolism is minus 17. After taking thyroid extract periods are now coming every six weeks.

Leucorrhea is a very common result of emotional states. It develops from the oversecretion of perfectly normal organs (I am speaking of cases in which there is no pathology). This symptom is often associated with others and always means an accompanying congestion. It may be due to various causes among which may be noted masturbation, long engagements with overstimulation, or emotional crises. Practically all cases which show pelvic congestion also complain of leucorrhea. In most cases leucorrhea is not, however, the presenting symptom. When this is the case, I think there is apt to be a presumption in the mind of the gynecologist that he is dealing with an inflammatory condition, whereas quite the reverse may be the fact. Examination of the cervical secretion will make the diagnosis easy and will often serve to call attention to the functional nature of the case. When the leucorrhea is of inflammatory origin, the secretion is thickened, opaque and mucopurulent, but when it is due to pelvic congestion alone the secretion is usually quite clear and noninfected.

For instance, an unmarried girl of twenty-three (5366) came in complaining of a most extreme and annoying leucorrhea of such severity as to cause chafing and pruritus. There was also a good deal of pelvic pain and backache. A curettage relieved for a time but did not effect a cure. It was then discovered that the real cause was worry about an engagement which members of her fiance's family were trying to break off. Her symptoms were not cured entirely until after she was married.

A second case (5082) is that of a woman of twenty-eight, married five years, who complained of sterility and leucorrhea. There was trouble with the ovaries but operation brought no relief until the emotional background had been discovered and treated. This patient was raped by a friend of her father's about the age of sixteen, and there is little question but that the emotional disturbance which persisted into married life was responsible for the sterility and the pelvic congestion. After a lapse of four years and intensive treatment along psychologic lines, the patient is now normally pregnant.

The second large group consists of those cases in which the symptoms arise from some difficulty with the relation between the sexes. The first cases are those in which coitus fails altogether as the result of impotence on the part of the husband. In those cases if the wife is at all passionate, symptoms may be very marked and there is likely to be intense pelvic congestion.

This is illustrated by the two cases following: the first (5595), a woman of twenty-six, married five and a half years, without children. She complained of leucorrhea and other symptoms of pelvic congestion. There was much disturbance of the periods which had become very scanty. The real trouble turned out to be impotence on the part of the husband. The other (5221) was a woman of thirty-four, married seven years, without children. Complaining of menorrhagia and abdominal pain. The real trouble in her case also was complete impotence on the part of the

husband. Both these cases were relieved by depletion. Treatment with them had to be directed toward relief of the congestion alone, as it was impossible to do anything for the impotence. In other cases, however, the impotence does prove amenable to treatment. The treatment usually is entirely psychologic and consists in unravelling the complicated emotional and social factors which have been responsible for the development of the condition. In cases of this sort, just as when dealing with cases of vaginismus, one must usually see and examine both husband and wife to bring about a cure.

To illustrate this point let me quote the case (5539) of a woman of twenty-nine, married five years, who had had one child three years previously. At the time of her examination she was in such an emotional state that she appeared to be in the depressed stage of a true manic-depressive insanity. It took some time to get at all the details, but eventually the following facts were ascertained. The husband was of a peculiar sensitive disposition. As a boy he had been an excessive masturbator and for some weeks after marriage he was impotent. At that time his wife had been sensible enough not to force the issue, and eventually coitus became normal. Though she was fond of her husband, her chief motive in marriage had been the desire for children. When she became pregnant she became cold toward her husband, and as a result he developed a feeling of jealousy toward the unborn child. This feeling grew to such an extent that he went off on a trip at the time the baby was to be born. The estrangement continued to increase. The wife had obtained what she wanted, and apparently felt little need for her husband. Then suddenly the year previous to the time of examination the baby died. In some way the wife blamed the husband's indifference for this tragedy and yet she now desired coitus in order to have more children. This attitude on her part brought back the impotence of the husband, and there had been no normal coitus for practically the whole year. An explanation of this causal sequence was sufficient to straighten matters out for both of them.

The causes of failure of coitus are many. Perhaps the most common is vaginismus. This may, or may not, be accompanied by a sort of relative impotence; on the other hand many cases which are thought to be impotence prove to be the result of some definite trouble on the part of the woman. Vaginismus is often caused by a tight hymen which does not easily rupture with intercourse. In some cases the hymen may remain unruptured for years; in fact, one of the most extraordinary features of this particular disturbance is the length of time which patients will allow to elapse, apparently because of a sort of false modesty, before seeking relief through medical advice.

An extreme case (4388) is that of a woman of thirty-four who was married ten years, without normal coitus. This was preceded by a four-year engagement. During the ten years of married life the patient developed an unusual number of symptoms, digestive, urinary, and pelvic. She also had a great deal of insomnia. She went from doctor to doctor vainly seeking relief, too diffident to disclose the true state of affairs. Her husband in the meantime gradually became relatively impotent as a result of a prostatic congestion. Both impotence and vaginismus were relieved when the psychologic mechanism by which they had been produced was explained.

Another unusual case (5548) is that of a woman of thirty-four, married seven years, without coitus. This couple also had been engaged for five years preceding marriage. When the details had finally been worked out it appeared that there was

trouble on both sides. During his adolescence the husband had discovered that he derived a peculiar sex satisfaction from stroking horses. He was naturally much ashamed of this and after marriage allowed his previous fears and anxieties to affect him in such a manner that he became impotent. His wife was naturally a rather passionate type and because of lack of satisfaction, she developed an extreme vaginismus. This case also was completely straightened out after the situation had been made clear.

It is interesting to note that in both of these cases the trouble was preceded by a long engagement. I feel that this may be a very potent cause of pelvic congestion in either sex and may cause all kinds of symptoms, to say nothing of subsequent sterility. The cause apparently is due to over sex stimulation without satisfaction. Cases of this sort might be multiplied almost without limit. I cannot help quoting one other, however, because of the extraordinary duration of the symptoms.

This (5675) was a woman of thirty-four, married eleven years, without children. She and her husband were engaged seven years, and when they married coitus proved to be impossible because of vaginismus and prostatic congestion. The trouble in this case was completely relieved one year ago, but as happens so often, the sterility has persisted, and the patient now has large cystic ovaries.

This leads me to say a few words about sterility as a symptom in cases of this sort. When functional disturbances are at all severe or of long standing, it is rare indeed to have pregnancy occur readily. Apparently the chief factor in disturbing "the mechanism of fertility" is chronic pelvic congestion. When this is relieved before too long a time has elapsed, either by depletion or correcting the emotional disturbance back of the congestion, there is usually a complete return to normal fertility, but when, as in the last case cited, the symptoms are of long duration, one is very apt to find changes in the organs themselves. Personally I believe there is a causal relationship between chronic passive congestion of long duration and a certain type of pelvic pathology. This is notably the case with the ovaries which are apt to become thoroughly cystic and cease to function as regards egg production. This has happened in the case noted above. It is the sort of case in which a functional cure of the emotional disturbance will not be sufficient to correct the sterility. The only chance for a relief of the sterility will be operative treatment of the ovarian condition.

There are many other symptoms which arise as a result of an abnormal unsatisfactory relation between the sexes. They vary enormously from indigestion, headache or insomnia to bearing down sensations, leucorrhea or backache. Symptoms may be called forth where coitus is complete but painful. In this instance the trouble seems to arise from a lack of satisfaction of the woman's sex instincts, although she may be totally unaware of any such desire. It is, however, the pain which forms the presenting symptom.

One rather unusual case (5517) was that of a woman of thirty-two who had been married three years and who had had one child soon after marriage. Because husband and wife were of different religions, friction amounting to extreme unhappiness developed over the church in which the child was to be brought up. The husband refused to allow his wife to have a second pregnancy, and to avoid this, he practiced a method of birth control which he had learned from a friend. This method was so cumbersome as to remove all spontaneity from their relationship eventually leading to a kind of emotional impotence. This in turn, both because of the impotence and of the method employed, caused the development of dyspareunia and failure to satisfy the sex life of the woman.

Two other common abnormalities of coitus leading to the production of emotional disturbances and secondarily of pelvic congestion in the woman are excessive coitus and coitus which stimulates the woman but does not give her the normal relief of the orgasm. Cases of this sort are very frequent indeed and in fact might be said to be the rule in early marriage, where the woman has previously led a sheltered life and there has been no full arousing of her sex feelings. They are, of course, much more frequent when marriage occurs late in life. Usually the cure is spontaneous with the readjustment which takes place in the first year after marriage. There is, however, a type of ignorant or selfish husband who permits the condition to persist, and cases are all too commonly seen where the congestion has led to subsequent infection or permanently disturbed function.

For instance, there is the case (5034) of a woman of twenty-eight who had been married for fifteen months, during which time she had had intercourse two or more times daily. She came in complaining of metrorrhagia, frequency, and failure to have children. There was intense pelvic congestion. In this case it took two years of treatment, both office and operative, to relieve the symptoms and bring the organs into a condition in which conception was possible.

Occasionally the trouble arises from absence of intercourse where intercourse is anatomically possible. Abstinence may be voluntary, as in the case (5622) of a woman of thirty-four, married nine and a half years, who stated that she and her husband had remained completely continent for a year and a half after marriage as a method of birth control. There was, of course, constant sex stimulation, and a sufficient functional disturbance occurred to delay conception for two years after normal intercourse was practiced. After the birth of this child there was again a period of continence lasting fourteen months. That patient consulted me because she had been unable to have a second pregnancy although she had been trying for four years. She complained of frequent backache and much leucorrhea.

In other instances peculiar psychic states in one married partner may lead to an aversion to intercourse sufficient to inhibit it altogether. If the other partner retains normal sex desire, there may develop all sorts of secondary symptoms, particularly if it is the woman.

The last group is one of symptoms which may develop from emotional states in pregnancy. It is, for instance, not infrequent to have abortion brought on as a result of extreme emotion. Lesser emotions will often cause flowing.

This is well illustrated by the case (5082) of a woman of thirty-three, married nearly ten years without children. She was of an intensely emotional temperament and her case has been referred to previously in another respect. After long treatment she became pregnant and is now some four and a half or five months along. After she was seen a month ago, at which time a positive diagnosis of pregnancy was made, there was such intense excitement that on returning home she had a copious blood-stained serous discharge soaking through two or three pads. It looked as though the membranes had ruptured, but the pregnancy is going on normally at this time, and it is now obvious that the flow came merely from a tremendous overactivity of the cervical glands.

There is one case on record in which listening to music during pregnancy would produce such congestion as to cause a profuse leucorrheal flow and eventually abortion until this cause had been recognized and removed. It is also, of course, well recognized that many of the extreme cases of the nausea and vomiting of pregnancy, which at first sight seem to be pernicious in character, are in reality due to some difficult social or marital condition at home.

Cases of this sort are so frequent that the first principle of the treatment of the excessive vomiting of pregnancy is the isolation of the patient from all outside influences. They fall, however, more under the jurisdiction of the obstetrician than under that of the gynecologist, and for this reason I shall not take up more of your time in discussing emotional disturbances in pregnancy.

I feel that this has been a very inadequate presentation of a very important and much neglected phase of the practice of gynecology. As I stated in the beginning of the paper, my presentation is intended merely to be suggestive in character, and not in any sense to be an exhaustive one. In concluding, I wish to emphasize several points which seem to me important. In the first place the fact that a patient complains of a given symptom is not evidence that there is necessarily any disease present. A symptom merely means disturbed function. The pelvic organs may exhibit functional disturbances because of the presence of disease or mechanical abnormalities or their function may be altered by emotional states of the woman through their effect upon the circulatory or endocrine systems. I have presented some of the more common symptoms with the emotional states which have produced them. This would seem to be a field for cooperation between the gynecologist and the psychologist or internist. It is a field which none of us can afford to neglect. It must also always be borne in mind that, even when disease is present, symptoms may have another or at least a combined origin. In other words, in our search for pathology in the pelvis, we should never forget that primarily we must deal with the patient as a whole.

(For discussion, see p. 804.)

## RESULTS OF OPERATIONS FOR RETROVERSION\*

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IN THE following paper an effort is made primarily to analyze the end-results of 1,000 operations for retroversion of the uterus performed by a group of surgeons upon patients in the public wards of the Woman's Hospital, extending over a period of five and one-half years, from January 1, 1919, and covering, roughly, 9,000 admissions. Such a study, however, must take into account other aspects of retroversion than operative end-results alone and must consider to a certain extent anatomy, etiology, and symptomatology.

It is not to be understood that all our retroversions come to operation, for many patients, particularly the recently-delivered women who return to the postpartum clinic, undergo palliative treatment in the out-patient department.

In a large number of the patients in this series there were associated pathologic conditions of the pelvic organs which contributed to the symptoms for which relief was sought, and some probably would not have come to operation had there not been diseased adnexa, restricted mobility of the corpus from adhesions, or associated relaxation of the supporting fascial structures of the pelvis. But in a great majority of the cases under consideration retroversion, although not the sole lesion, was distinctly the outstanding one and, therefore, may be regarded as the primary cause of the patient's symptoms.

The term retroversion, strictly speaking, refers to a displacement of the uterus, in which the organ simply is turned backward upon an imaginary axis corresponding to the level of the internal os, and in which the relation between the corpus and the cervix remains unchanged. In the latter stages of many retroversions, however, there is an associated retroflexion or backward angulation at the junction of the cervix and the corpus by which the malposition becomes a combination of the two lesions, appropriately called by many retroversion-flexion. But, since the two conditions are so frequently associated, it may be assumed that their etiology and symptoms are identical, and therefore they may be considered together. Hence the term retroversion is used in its broader sense and is taken to mean either simple retroversion or a combination of retroversion and retroflexion, especially as there is no difference recognized in their treatment. Simple retrocession, in which the uterus is carried bodily backwards, and where there is no change in the normal version or flexion, is not regarded in this class.

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\*Read at a meeting of the New York Obstetrical Society, December 14, 1926.

It is not the purpose of this essay to consider the subject of retroversion in the abstract nor in this connection to review the anatomy and function of the various supporting structures of the pelvic organs and the effect that alteration in them has upon the position of the uterine. But it may be desirable to note that the literature upon this subject and upon the subject of prolapse is quite vague in the matter of clearly differentiating the causes of these two lesions and many authors are inclined to consider retroversion as due to precisely the same fascial defects as prolapse or, indeed, to regard retroversion in many cases as the first step in descensus and therefore an essential part of the latter condition. One standard textbook states that uterine prolapse is invariably preceded by a stage of retroversion, a dictum which is not borne out by our experience, as we have seen numerous cases of prolapsed uteri in which the corpus has been found close up behind the symphysis pubis. These points are recalled in order to emphasize that retroversion, to use an obstetric term, is essentially a change in attitude of the uterus, whereas prolapse, on the other hand, is an alteration in the height or level of the organ. They are separate conditions, dependent largely upon different causes and may be seen either quite alone or in various combinations.

AGE INCIDENCE

UNDER 20 YEARS	20-29	30-39	40-49	50 AND OVER
12	516	358	71	43

A normal pelvic diaphragm, of which the fan-shaped plane of fascial structure in the base of the broad ligaments is one of the chief elements, maintains the cervix at its proper level. This augmented fascial area, often termed the cardinal ligaments of the uterus, is quite distinct from the structures which go to maintain the uterus in its normal attitude of anteversion, an observation which, if correct, proves the futility of attempting to cure prolapse by a combination of perineorrhaphy and correction of a retroversion. The influence of the round ligaments upon the height of the cervix is little or none, but they, together with the connective tissue bands in the middle and upper part of the broad ligaments, are the most potent agents in holding the corpus forward. By drawing the uterus to the hollow of the sacrum and thereby rotating the organ upon its imaginary axis, the uterosacral ligaments, without doubt, contribute also to this same action.

The age incidence of the women of this series is not an important factor in the analysis and is entered simply as a matter of record. However, it plainly may be seen to reflect parturition as one of the principal causes of the lesion, as a great majority of the patients applied for treatment in the third and fourth decades of life, in contra-



distinction to the higher age incidence of uterine neoplasms. Only 12 of the patients were less than twenty years and most of these had the so-called congenital type of retroversion that is regarded as productive of pain or other disorders associated with menstruation. Slightly more than half of the patients were in the twenties, of whom more than three-quarters were in the latter half of this period. About a third were in the thirties, making an aggregate of nearly 90 per cent between the ages of twenty-one and forty. The remaining women, a little over 100 in all, were more than forty years of age, and of these more than two-thirds were less than fifty.

The question as to what percentage of all varieties of retroversion gives rise to symptoms would appear to be a difficult one to answer and could be solved only by routine pelvic examination of a large series of women taken at random. Nevertheless, it is hard to see how very many of the women who come under the observation of the gynecologist for retroversion can be without symptoms, as it is almost always because of symptoms referable to the pelvis or abdomen that the patient is obliged to consult a physician. There are many who deny that simple movable retroversion is ever an operable condition and condemn this method of treatment. In a comparatively recent address, Dr. George Gray Ward, surgical director of the Woman's Hospital, took occasion to answer a much-discussed editorial upon this subject by a well-known general surgeon, in which the latter accused the profession, particularly gynecologists, of subjecting thousands of women to what he termed the unwarranted procedure of operation for retroversion. The undesirable effect such a statement might have upon "the superficial reader, the unsophisticated, and the inexperienced" was pointed out, and figures from Dr. Bullard's study, made in our clinic, were quoted, showing, among other things, a relief of symptoms, chiefly backache, in every one of 23 cases of uncomplicated retroversion which were corrected surgically.

As before noted, many of the present series had varying degrees of adnexitis or small neoplasms of the uterus or ovaries as complications, but a total of 151 patients, or approximately 15 per cent, showed no pathology other than the malposition, and the correction of this was the only surgical procedure carried out, except for a prophylactic appendectomy, which it is our custom to perform when the organ is accessible and other factors permit it. Of these simple uncomplicated retroversions, more than 80 per cent showed after operation complete relief of symptoms for which the patients were admitted to the hospital, and an additional 15 per cent showed varying degrees of improvement, leaving only 5 per cent of the entire sub-group to be classified as failures. The most prominent symptom in these uncomplicated cases was abdominal pain, and it occurred as the chief complaint in approximately one-half of them, whereas backache was

found to be the outstanding complaint in only about 25 per cent. This series, therefore, fails to verify the generally accepted teaching that backache is the classical complaint in simple retroversion. Five per cent of the women with uncomplicated lesions gave sterility as their chief complaint, and about the same proportion were admitted because of dysmenorrhea. Another small group applied for treatment because of other menstrual disorders and irregularities, chief of which was metrorrhagia.

## SIMPLE UNCOMPLICATED RETROVERSIONS (151)

SUCCESSSES	PARTIAL SUCCESSES	FAILURES
121 (80%)	21 (15%)	7 (5%)

The symptoms presented by the entire group, as mentioned before, were quite likely aggravated by the accompanying pelvic pathology, but it is reasonably safe to assume that the retroversion,—in these cases the outstanding lesion,—was the chief contributor to the patient's discomfort. Just as abdominal pain stood out most prominently in the uncomplicated group, so did this symptom appear as the chief complaint in the largest number of the series taken as a whole. A total of 484, or nearly 50 per cent, of the 1,000 patients gave abdominal pain as their chief complaint, while only 17 per cent came in because of backache. The pain was generally described as a sensation of vague pressure, discomfort in the hypogastrium, often more prominent on one side or the other, and aggravated by general fatigue or menstruation. Many of these patients complained secondarily of backache or disturbances of menstruation, and a large number had bladder irritability and sensation of pressure and bearing-down in the

## PRIMARY OR CHIEF COMPLAINT

Abdominal pain, 484.	Leucorrhea, 40.
Backache, 171.	Menorrhagia, 28.
Metrorrhagia, 52.	Sterility, 26.
Miscellaneous, 199.*	

\*Includes dysmenorrhea, pressure on rectum, bearing-down, frequency, urgency, dyspareunia, headaches, habitual abortion, "falling womb," fatigue, general asthenia.

perineal region. Menorrhagia or metrorrhagia, or both, was the primary complaint in 8 per cent of the patients, and of the two symptoms an irregular type of uterine bleeding was shown to be almost twice as common as a prolonged or otherwise altered flow coming at the regular time. That leucorrhea may be caused rather frequently by other than cervical lesions seems to have been demonstrated by these women, as forty of them came to us with that complaint, of which only one in five had an accompanying endocervicitis. The next most numerous group was made up of sterility cases, 26 women applying for treat-

ment primarily on that account and 19 others mentioning it as a secondary symptom. Of the patients who did not present symptoms already mentioned, there remains a motley group making up about 20 per cent of the whole number, and among the complaints elicited were dysmenorrhea, dyspareunia, rectal pressure, bearing-down, frequency, urgency, headaches, habitual abortion, "falling womb," early fatigue, and general asthenia.

In view of the recent impetus given to the investigation of sterility by the study of compatibility of spermatozoa with vaginal secretions and of transuterine gas insufflation of the fallopian tubes, it may be well to record at this point our results of operative treatment of this condition where retroversion was a factor. In only one of the 45 sterility cases was there an anatomic failure of the retroversion operation during the period of follow-up observation, while, considered from the subjective standpoint, it is found that 12 patients, or about 22 per cent of the group, were successes, in that they became pregnant within a few months. Two-thirds of these women had simple, uncomplicated, freely-movable retroversions, and in one-third the mobility of the uterus was restricted by inflammatory adhesions and the appendages were more or less involved in the process. Therefore, a little better than one in four patients was relieved of sterility following the correction of a retroversion, regardless of the presence or absence of complicating lesions.

All our public ward patients are instructed to attend the follow-up clinic, the laparotomies remaining under observation two years, the plastic cases three years, and the malignant processes indefinitely. Quite naturally, not all cooperate to the fullest extent in this respect, but a fairly good percentage is secured on the whole, and in this particular group the average period of observation was between nineteen and twenty months.

In the interpretation of end-results the success of the operation is judged both objectively and subjectively. In this study the objective findings concern only the position of the uterus and interpret whether or not the organ has remained in the new position throughout the period of follow-up. The subjective findings are concerned with the patient's own feelings and, as we see it, are much the more important aspect of this work. Is the patient glad she had the operation? Is she relieved in part or in whole of the symptoms for which she entered the hospital?

The classical operations for correction of retroversion need not be described or even enumerated here, but it may be well to record a few facts as to the commoner types of operation done in our clinic. All of these operations depend chiefly or entirely upon the round ligaments to support the corpus in its anterior position. Standard operations, such as the Gilliam, Baldy-Webster, and Coffey, which find great

favor with the general surgeon, are comparatively little employed, while the Simpson-Montgomery procedure is extensively used, either alone or in conjunction with plication of the uterosacral ligaments as described by Noble and others. The operation presented in a paper before this Society by Dr. Grad, in 1921, consisting of a subperitoneal suture of the round ligament to the fibers of the internal ring, is done in a fair proportion of cases, as is the procedure devised by Dr. Bissell. A word may be said about the latter which Dr. Bissell did first in 1901 and since has modified to a certain extent. In it a distinct departure from the usual round ligament suspension type of technic is made, for not only is the round ligament utilized, but, in addition, the broad ligament is split and plicated, making a doubly strong support. The normal anteversion is somewhat overcorrected and accentuated and a single absorbable suture, intended to hold only during the hospital period, apposes the corpus to the anterior abdominal wall. Ventral suspension or fixation by plain or chromicized catgut, or by some non-absorbable suture material, is used fairly frequently, particularly in those cases where the childbearing function has been eliminated by salpingectomy. In a few cases of this series the external Alexander operation was employed, and four times in all the surgeon made use of plication of the uterosacrals without utilizing other supporting structures.

#### SCHEDULE OF OPERATIONS

Simpson-Montgomery,	370.	Coffey,	43.
Ventral suspension,	160.	External Alexander,	17.
Gilliam,	113.	Ventral fixation,	12.
Bissell,	110.	Modified Simpson,	12.
Grad,	83.	Baldy-Webster,	10.
Simpson-Noble,	63.	Others,	7.

The anatomic results of this group of operations, as a whole, proved surprisingly good, but before recording them, the relative numbers of the various types may be noted, so that the comparative merit of each may be gauged. The Simpson-Montgomery operation proved the most popular and was done upon approximately 43 per cent of the patients, a small proportion of these having plication of the uterosacrals as well, although the latter procedure is regarded only as an adjunct to the former. Ventral suspension was next in order of frequency and was done in 16 per cent, while the Gilliam and Bissell methods stood about equally at, roughly, 11 per cent each. The Grad operation was chosen in a little over 8 per cent, and the Coffey in about 4 per cent. The remaining cases, totalling between 5 and 6 per cent of the whole, were distributed among seven different types of operation, ranging from 17 cases of the external Alexander downward through various smaller numbers of ventral fixation, Baldy-Webster, modified Simpson, the

internal Alexander, and simple plication of the uterosacrales by either the abdominal or the vaginal route.

In only 40 of the 1,000 cases were anatomic failures reported. So in 24 out of 25 women the uterus was found to be in good anterior position as long as they remained in the follow-up clinic, and since the period of observation averaged nearly twenty months, it may be safe to assume that most of these cures were permanent ones. This finding speaks well for the mechanical efficacy of the average operation for retroversion and leaves little to be desired from the standpoint of operative technique, particularly as the work was performed by a number of individuals with resulting variation in the actual execution of the several steps.

The time at which recurrence took place ranged from one month to two and a half years, the longest of these having followed a full-term pregnancy and difficult operative delivery. The average time of recurrence for the group of anatomic failures was ten months. The question arises whether the relative merit of the various operations should not be interpreted with some reservations, as the best results in a rather complicated procedure, such as Bissell's, can be obtained only by those skilled in exactness of technique, whereas operations, such as the Gilliam or the Coffey, that are relatively simple to do, should be performed almost equally well by all who are familiar with surgical technique in general.

APPROXIMATE PERCENTAGE OF RECURRENCES

Plication of uterosacrales,	50.0	Grad,	4.0.
Baldy-Webster,	10.0	Coffey,	2.5.
Ventral fixation,	10.0	Simpson-Montgomery,	2.5.
Gilliam,	4.4.	Ventral suspension,	1.9.
Bissell,	1.8.		

The highest percentages of failures were found in those cases where the uterosacrales alone were utilized, since two of four such operations promptly failed. The Baldy-Webster failed once in ten times, too small a total, of course, from which to draw deductions, but the varying complications and disappointments recorded by Dr. Polak in his study of 376 cases leave much to be desired for this procedure. The Gilliam and the Grad were next in order of recurrence with 4.5 and 4.0 per cent of failures, respectively, while the Simpson-Montgomery and the Coffey each failed in 2.5 per cent. Of the types done at all extensively, Bissell's operation and the several varieties of ventral suspension showed the best results with slightly less than 2 per cent of failures in each case. The external Alexander registered no failures in 17 attempts, a record which strongly justifies the recognition of a technique now little used because of its limited field of application.

An interesting observation with regard to these anatomic failures

is that three out of five were relieved of the symptoms for which they were admitted, regardless of the recurrence of the displacement, suggesting the extent to which the complicating lesions contributed to the patients' discomfort. Only two-fifths of the anatomic failures were partial or complete failures symptomatically as well.

The end-results of these operations, considered subjectively, are more difficult to classify than when estimated from the objective standpoint. This is largely because very few of the women entered with a sole complaint so that the presence or absence of that one symptom or condition later would be the criterion upon which to formulate judgment. A great majority of these patients came in complaining of two, three, or even four distinct symptoms, so that the total number of instances of persistence of backache, abdominal pain, sterility, or other symptoms becomes considerably larger than the number of individuals in whom they occur.

#### WHOLE SERIES CONSIDERED SUBJECTIVELY

Successes,	880 (88 per cent).
Complete or partial failures,	120 (12 per cent).

An aggregate of 120 patients was classified as partial or complete failures in the entire series, making successful outcomes in 88 per cent of the patients operated upon, but as many of those unrelieved had more than a single persistent symptom, the number of unsuccessful attempts to relieve individual complaints was a little more than doubled. The analysis of individual symptoms shows that operation had a higher percentage of good effect upon some varieties of complaints than upon others. The relief of abdominal pain and backache, for instance, is more often produced than improvement in the various menstrual disorders, including dysmenorrhea, or a favorable effect upon sterility, as shown previously.

Abdominal pain and backache were relieved in about 90 and 85 per cent of cases, respectively, whereas the menorrhagias and metrorrhagias were improved in only a little over 60 per cent.

#### FULL-TERM PREGNANCY IN SUSPENDED UTERI

Total number,	34,	Subsequent recurrences,	5.
		No effect upon position,	29.

On the whole, the end-results from the standpoint of the patient certainly warrant surgical interference in the type of lesion encountered in the patients of this series. Nearly nine out of ten women were completely relieved of the symptoms for which they entered the hospital, and many of the small group not completely cured showed appreciable improvement.

The effect of pregnancy upon the suspended uterus seems to be of little consequence, judging from this group of patients, although the number of parturitions following operation is too small to draw valuable deductions. Altogether, 76 women became pregnant while under our observation, but half of these went elsewhere for their confinements and could not be located for examination after delivery. Of the 38 patients observed, 34 continued to full term and four aborted spontaneously at various stages. In all but five of the full-term cases the uterus was found to have remained in good position after delivery, an aggregate of 85 per cent of successes. Of the five anatomic failures, four were done by the Simpson-Montgomery method and one by the Bissell, and in none was the organ in more than what is commonly described as first or second degree retroversion. The four women who miscarried did so without effect upon the position of the uterus, two having had a ventral suspension and two the Simpson-Montgomery method. One patient, a case of Grad suspension, developed a tubal pregnancy a year later and came to laparotomy again on this account, although the position of the uterus remained good.

#### SUMMARY

The observations made in the course of this study may be summarized as follows:

1. Retroversion as seen and treated at the Woman's Hospital is most often complicated by an accompanying inflammation of the cervix or adnexa with resulting peritoneal adhesions which restrict or even completely inhibit the mobility of the corpus.

2. In very few or no instances can the operator be accused of unwarranted surgery in this group of cases. Even in the patients whose uteri were freely movable, a definite complaint was present, and in over 90 per cent of these distinct improvement followed correction of the malposition.

3. The percentage of all retroversions which produce symptoms cannot be determined from a group such as this, for all these women, except possibly a few who came for sterility, presented definite complaints before operation.

4. Abdominal pain of various types and degrees appears to be a more constant symptom in retroversion than the time-honored backache, although the latter also appears in a large proportion of cases.

5. Retroversion, more than almost any other gynecologic lesion, is an affection of the childbearing period.

6. Only 4 per cent of a large series of patients with retroversion complained of sterility, and more than half of these had also inflammation of the adnexa. Pregnancy followed operation, roughly, once in four cases.

7. The series shows 96 per cent of anatomic cures throughout the period of observation, which averaged twenty months, speaking well for the present-day method of handling this condition.

8. There appears but little to choose between the several varieties of round ligament suspension as far as mechanical end-results are concerned. Of the operations frequently done, Bissell's yielded the lowest and Gilliam's the highest percentage of recurrences.

9. The plication of the uterosacra alone was distinctly unsuccessful in the few such cases done, although they are probably valuable adjuncts in other suspension methods.

10. End-results of retroversion operations considered symptomatically, appear to depend largely upon the symptoms which the lesion produces. One may expect a higher proportion of cures when the patient enters for pain, backache, or other discomfort than when she applies for relief of sterility or some disorder of menstruation.

11. That the reconstructed supporting ligaments of the uterus can undergo evolution during pregnancy is demonstrated by the paucity of spontaneous abortions in women who have undergone operation.

12. A full-term pregnancy was followed by a recurrence of retroversion in a previously-suspended uterus, roughly, but once in seven cases.

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(For discussion, see p. 801.)



## A CASE OF ABDOMINAL TWIN PREGNANCY PRESENTING UNUSUAL FEATURES\*

BY JAMES A. HARRAR, M.D., NEW YORK, N. Y.

**A**BDOMINAL pregnancy, perhaps better termed advanced ectopic pregnancy, has occurred ten times at the New York Lying-In Hospital in 156,000 confinements, an incidence of one in 15,600. It is possible to judge from a study of the histories that these cases were all of the secondary abdominal type. Five were true intraligamentous, two tuboabdominal, one, the rarest type of all, uteroabdominal; and two indeterminable, as the sac adherent to the anterior abdominal wall was opened into directly and not otherwise oriented. These ten cases include the three cases previously reported by Drs. A. B. Davis and C. F. Jellinghaus, and a fourth case about to be described.

The majority, six, occurred in primiparas; three in para ii, and one in a para iii. Six women lived and four died, a mortality of 40 per cent. Of the four that died, two were frankly septic on admission, and one was in hemorrhagic shock from efforts at vaginal delivery before admission to the hospital. The fourth died from hemorrhage accompanying removal of the placenta of a living fetus. Of the six that lived, all were delivered of macerated fetuses by laparotomy. Of the four that died, two had macerated and two had living fetuses.

The two infants that were born alive died within a few hours, one a six months premature and the other at full term, of atelectasis and asphyxia.

It is evident from these histories, as Cragin states in his textbook, that the diagnosis is often overlooked and in many cases difficult. The landmarks of the pelvic organs are largely obscured by inflammatory adhesions binding them together, the uterus is often incorporated with the gestation sac and seems practically a part of it.

Three helpful points in diagnosis should be:

1. History in the early months of supposed miscarriage, with possible passing of shreds of tissue.

2. Ability to feel the fetal parts suspiciously close beneath the abdominal wall. This is not so valuable a sign as would at first appear, it is not uncommon in normal intrauterine pregnancy, and abdominal tenderness in advanced ectopic pregnancy usually prevents satisfactory palpation. An attempt to make the uterus identify itself by stimulation to contraction would help to differentiate it.

3. The most important is finding the uterine canal short and empty.

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\*Read at a meeting of the New York Obstetrical Society, December 14, 1926.

CASE REPORT.—Mrs. L. B., aged thirty, a para iii, after observation for two months in the antepartum clinic, was admitted to the Lying-In Hospital October 28, 1926, with a provisional diagnosis of dead fetus in utero accompanied with fibroids. There was slight vaginal bleeding, absence of fetal heart sounds, and the fundus measured 23 cm. above the symphysis. The Wassermann test had been reported as three-plus. Her previous history in the antepartum clinic was that on September 1, the fundus was 27 cm., the size of an eight months pregnancy, that the fetal movements were active but that there were no fetal heart sounds audible. At her second visit, September 15, the fundus measured 28 cm. On October 11, the fundus had decreased to 23 cm. and recently she had had a sudden pain in the left upper quadrant while being examined in the clinic, and felt as though something were suddenly bulging there. She never felt life after that time. Her previous obstetric history was that she had had one child four years previously and subsequent to that a miscarriage. She was a former patient of Dr. N. R. Lederfeld, who has kindly given us the following history:

During 1925 she had complained on several occasions of menstruating every few days, and of dyspareunia. Upon bimanual examination the uterus had been sensitive and the left adnexa very tender. Her blood pressure was 110/70 and her Wassermann test two-plus. She was anxious to have a baby as her first child had died when nine months old of convulsions. He gave her treatment for syphilis. In March of this year she came to him two months' pregnant and he repeated the antisypilitic treatment. Two weeks later she was seized with a severe pain in the lower abdomen and dizziness. He found the abdomen quite tender, pulse and temperature normal, and no vaginal bleeding. The pain was relieved with morphine, but in a few days it recurred with fainting spells, and she remained in bed two weeks.

The patient herself gave us the following history: Her last monthly period was in January, 1926. The attacks of pain which she had in March and April were similar to severe menstrual cramps. These lasted with decreasing severity for two weeks and she then returned to work and worked until the first of July, when she had an attack of pain similar to that in April. This attack lasted a week and then cleared up. From that time on she had occasional mild attacks of pain in the lower abdomen.

On admission (October 29, 1926), the red blood cells were 3,640,000, hemoglobin 70 per cent, temperature 99.4°, pulse 90, and respiration 24. There was slight vaginal bleeding for the first time.

On November 6, after two days' dilatation of the cervix with iodoform gauze, it was possible to pass the index finger about ten cm. to the top of the uterine cavity where indentations to either side represented evidently the tubal ostia. This examining finger in the uterus could be closely approximated to the external abdominal hand to the right of the adjoining large mass that extended behind and to the left almost to the umbilicus, and a diagnosis of advanced ectopic pregnancy was made.

At operation two days later, through a median incision below the umbilicus a purple cystic mass, 15 cm. in diameter, presented. There were a few omental adhesions to the anterior abdominal wall and to the anterior surface of the tumor requiring ligature. This mass was otherwise covered with smooth membrane resembling peritoneum. It was adherent to the posterior surface of the uterus, which was pushed forward and to the right and which was enlarged to the size of a three months' pregnancy. The tumor mass was also adherent to the brim and cavity of the false pelvis posteriorly. All of these adhesions were broken up manually without much bleeding, except at the left cornua of the uterus just posterior to the insertion of the left round ligament where the tumor was firmly attached. Later examination showed the left tube stretched across the posterior surface of the mass. The mass was then cut away from its firm possible attachment at the left uterine cornua,

the oozing from the cut uterine muscle controlled with mattress sutures, and a loop of round ligament stitched over it.

Below the tube and attached to the posterior surface of the tumor mass was an irregular hard calcareous structure about 4 cm. in diameter, at first thought to be a calcified ovary. The left ovary was afterwards identified at a distance from this calcareous structure.

At this point in the operation deep in the abdomen among the prolapsed intestines was disclosed the end of a yellow degenerated umbilical cord, torn off unobserved from the under side of the large mass during separation of the adhesions. Following this up a badly macerated seven and a half months' fetus was discovered and withdrawn from just beneath the liver. Loops of small intestine were intimately adherent to one side of the fetal head and to its abdomen just above the umbilicus. The skin of the scalp and of the abdomen of the fetus was clipped away and left adherent to the loops of small intestine.

A number of small masses resembling small cooked lima beans in size, shape, and color, each attached by a stringy pedicle were clipped away from various locations on the omentum, tumor mass, and intestine. These later proved to be small organized blood clots, and were the only remaining signs of previous intraabdominal hemorrhage.

All that remained of the sac were some thick yellow fragments of membrane picked out from between coils of small intestine. Three large drains were inserted behind the uterus and up toward the location of the removed fetus. No vaginal drainage was employed.

The drains were removed entirely in a few days. The convalescence was uneventful and the patient was discharged on the fourteenth day.

*Pathologic Report* (By Dr. Losee).—The specimen was composed of a spherical mass of tissue removed from the cornua of the uterus measuring 15 by 12 by 12 cm. and a fetus with the umbilical cord attached. Its surface was smooth and apparently covered with peritoneum. A portion of the fallopian tube, 6 cm. in length, was attached to this tumor and adherent to the fimbriated extremity of this tube was a calcareous structure which proved to be an embryo, of about the third month. There was also an ovary adherent to the mass and situated about 3 cm. from the fallopian tube. Section of tumor showed it made up almost entirely of placental structure infiltrated with blood and covered with several layers of a dense connective tissue. Microscopic examination of sections from different areas showed numerous chorionic villi with extensive red-celled infiltration in the intravillous spaces and some canalized fibrin. On the surface there was much thickened chorion and amnion. Microscopic examination of that portion of the tumor in which typical uterine muscle was observed, showed a portion of the fallopian tube which passed through the uterine wall. Serial section of the structure in this area showed a definite cavity partially lined by a single layer of epithelium and somewhat distorted. It did not line the entire cavity. The cavity contained red blood cells and a portion of the wall was absent. It is quite possible that the rupture took place in this location out between the layers of the broad ligament.

Microscopic examination of that portion of the fallopian tube which was attached to the tumor showed typical structure and the lumen empty. The muscle coats were hypertrophied and edematous.

The smaller embryo at the fimbriated extremity of the tube exhibited some calcification of the head, with the ribs and some of the long bones apparent.

The ovary measured 2.5 by 2 by 1.5 cm. Section showed small cysts of the follicles and edema of the stroma. There was no corpus luteum observed.

The larger fetus measured 33 cm. and presented extensive maceration of the skin and subcutaneous tissues, as well as of the entire viscera. Section of the lower extremity of the femur was negative for osteochondritis.

The umbilical cord was 37 cm. in length and presented a definite constriction at the placental extremity. There was no cord observed on the surface of the tumor mass.

*Diagnosis.*—Ruptured intraligamentous twin tubal pregnancy.

From the gross and microscopic examination of the specimen it is quite possible that this pregnancy took place in that interstitial portion of the tube adjacent to the isthmus. This was a case of primary intraligamentous twin pregnancy, becoming abdominal. We have a definite history of left-sided pelvic inflammation antedating conception. The case is also interesting in that one of the twins succumbed at the third month and was well on its way of becoming a lithopedion five months later, while the other twin lived for seven and a half months and then died coincidentally with rupture of the sac intra-abdominally a month before operation.

119 EAST SEVENTY-FOURTH STREET.

(For discussion, see p. 797.)

## PREVENTION OF CARCINOMA OF THE CERVIX\*

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"All assertion in this world of doubt is insolence."—Conrad.

THE time has come to consider cancer prevention. No one could have listened through the days of the Mohonk Cancer Conference without realizing that the world is fully awake to the seriousness of this pathology and utilizing a high intelligence in developing agencies for its study and treatment. As one result an educational propaganda is being disseminated among practitioners, students of medicine and the general public, its outstanding message being the imperative necessity of early recognition. A note of hopefulness rings through all this effort, in that appreciation of cancer's earliest signs, promises an increasing number of arrests.

It is quite natural that specialists from their respective departments should stress for the consideration of men engaged in general work, significant signals from the anatomies best known to each, and so the laryngologist asks special consideration for hoarseness appearing without obvious cause, the general surgeon warns of the veiled meaning of difficulty in swallowing, substernal discomfort, persistent digestive disturbance of doubtful origin, and asks closer scrutiny of

\*Presented at a meeting of the New York Obstetrical Society, December 14, 1926.

hemorrhoidal protrusions, while the gynecologist lays special emphasis upon the significance of irregular uterine bleeding and persistent vaginal discharge. In all countries today the slogan is early diagnosis, immediate treatment.

This is not enough. From concentrated study directed to this or that system, may come valuable suggestions in line with measures instituted so effectively against infectious diseases in the course of the past thirty years, and any well-founded observation which suggests a practical measure to be directed toward the prevention of cancer must assume definite importance. This contribution is a statement of my attitude toward the prevention of a type of carcinoma which in the United States registers a mortality of over ten thousand women yearly. Ewing, Sampson-Handley, Leach, Bastianelli and many others have insisted on the importance of persistent irritation in the cause of cancer, recalling the relationship between lip cancer and cigar or pipe irritation; buccal cancer and irregular foul teeth; scrotal cancer and the soot-sebaeous mixture, chronic infection and prostatic malignancy, and epitheliomata developing in x-ray workers. Recent observations link pyorrhea with throat, esophageal and gastric new growth, while injuries, sudden termination of nursing and mastitis are among the recognized precursors of breast carcinoma. You are all familiar with the work which has demonstrated the rôle paraffin and tar may play in causing new growths in laboratory animals.

In a survey of more than one hundred cases of carcinoma of the cervix, I have observed, and no doubt my observation is common knowledge, that the vast majority of patients so afflicted, have had this new growth engrafted upon a previously diseased cervix. Apparently every carcinomatous cervix had been the site of definite chronic cervicitis, preceding the malignancy, leaving the relationship when correlated with the generally admitted pathologic excitants elsewhere, startlingly suggestive.

Chronic cervicitis manifests itself symptomatically by vaginal discharge. In most cases applying for diagnosis and treatment, the presence of leucorrhea means cervicitis of greater or lesser degree. At any period of life, in all social states, it is the most common disease brought to the attention of the gynecologist, and constitutes the main pelvic reason for leading women to consult physicians. Because it persists through years, eternally stimulating abnormal epithelial tissue changes in an area prone to many insults, it constitutes the classic example of a predisposing cause for a malignancy which is a very scourge to women. Chronic cervicitis may regularly precede cervical carcinoma. It is a curable or removable disease. Doctors are insufficiently informed concerning its importance, its diagnosis and treatment, students are too little taught and public education has scarcely been attempted, yet a proper utilization of these channels

may lead to the broad ocean of safe sailing. The general recognition and cure of chronic cervicitis will cut down this incidence and might eradicate in large measure cervical carcinoma, which eradication would save ten thousand years of suffering in every one year of our national life.

Let every man working in the department of gynecology realize his unique privilege in that his specialty presents a carcinoma which develops within the field of his vision and his touch, that cervicitis is its common precursor, that once the disease appears only a pitifully small number of patients will be seen in time for help, and of these but a fraction will receive care from those few gifted and enthusiastic workers who, since the physiologic effects of radium have been appreciated and the technic of its application understood, have devoted their best energies toward arrest or cure. Knowing this, let every chronically infected cervix be approached, not as a cervical catarrh, not as an hypertrophy, not as a laceration, but as the prologue of an epithelial drama whose curtain may be a malignant death.

(For discussion, see p. 798.)

## THE PRINCIPLES OF THE TREATMENT OF GENITAL PROLAPSE. THE TECHNIC OF VENTROFIXATION OF THE VAGINA\*

By L. FRAENKEL, M.D., BRESLAU

(Professor and Head of the Department of Gynecology and Obstetrics)

THE treatment of genital prolapse is essentially operative. The nonsurgical methods, including pessary treatment, massage and gymnastics, are only palliative; they do not cure. The prophylaxis of procidentia will not be considered as this requires too extensive a discussion.

The methods of operation were, from an historical standpoint, developed as follows:

1. Narrowing of the vaginal canal (Simon, Hegar) and perineal plastic operations to increase the height of the perineal body (Lawson Tait).
2. Amputation of the cervix (Schroeder, Kaltenbach) or hysterectomy (Fritsch).
3. Ventrosuspension of the uterus (Olshausen, Kelly).
4. Vagino-fixation and interposition of the uterus (Dührssen-Mackenrodt, Schauta, Watkins-Wertheim, Kjelland).

\*Read at the Twenty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, held in Chicago, Ill., September 27, 1914.

In the noneohabiting patient narrowing of the vagina to a ring-shaped stenosis may be done. The implantation of metal rings underneath the prolapsed posterior vaginal wall to attain the same end, as recommended by Thierseh and A. W. Freund, has not proved successful.

After extirpation of the entire uterus the stumps of the broad ligaments may be sewed to the vaginal wall, or both may be attached to the pelvic connective tissue of the lateral pelvic wall. In place of ventrofixation a fixation to the sacral promontory may be made (Küstner).

All of these methods helped in some instances and failed in others. In a few cases the methods seemed to be entirely inadequate and a combination of several had to be used. A carefully performed operation for an extensive prolapse requires for its performance ninety or more minutes; the methods vary greatly with different surgeons, a proof that a standardized method has so far not been developed. An operation, based on a sound principle good for all cases, is still wanting.

The operation I have developed and used for many years is perhaps the solution of the problem of surgical cure of genital prolapse. It is termed ventrofixation of the vagina. The suspension operations may be considered the best principle of the four methods mentioned; *however, the vagina and not the uterus should be suspended, even if a total prolapse of the uterus should be coexisting.* When the vagina is replaced upwards then the uterus and the urinary bladder also become replaced; the former does not lose its natural mobility and the cystocele disappears.

*Technic:* Laparotomy incision: uterus is pulled upwards and outward; transverse incision 2 to 3 cm. long in the vesicouterine fold; separation of bladder downward beyond the vaginal fornix. A suture armed with needles at both ends is now inserted through each half of the vaginal vault to right and to left. Each end is carried forward through (1) the visceral peritoneum, (2) the parietal peritoneum, (3) the external oblique muscle, (4) the abdominal fascia, and (5) the skin. The ends are then securely tied over a small gauze pad, so that the anterior vaginal vault is in broad and firm contact with the abdominal wall. The vesicouterine pouch is closed. Suture of the abdominal wall in four layers. The duration of the operation is twenty minutes. It does not matter whether the suture enters the lumen of the vagina or only penetrates the vaginal wall. The suture should be nonabsorbable and is removed on the fourteenth day, after a fibrous scar has formed in the suture canal. The gauze pads are used to prevent cutting of the skin. Should retroflexion of a heavy uterus coexist then the round ligaments are shortened. If a laceration of the perineum is present then a repair is added. Should the urethral eminence be prolapsed then a plastic for the latter is indicated, but mostly the vaginal suspension alone is sufficient.

Vaginal palpation at any future time elicits the cervix located higher up above the true pelvis beyond the reach of the examining finger. The vaginal canal is decidedly stretched. Edema of the vaginal walls has disappeared, the cervix is not elongated any more.

The following objections may be made to this procedure: (1) The vagina is forced directly upward to the anterior abdominal wall; it separates the bladder in two and prevents distention and filling in the median line. The disadvantage is transitory. About 25 per cent of the patients complain of ischuria or strangury following the operation. The symptoms invariably disappear within a few days spontaneously and, after application of a permanent catheter, immediately. Thereafter the capacity of the bladder is not lessened, because the lateral parts expand. Permanent difficulties have never been seen. (2) The vagina is fixed. This might interfere with (a) cohabitation, or (b) labor. The former does not occur. Labor after ventrofixation of the vagina has not been seen, as only patients beyond the child-bearing period were subjected to the operation. Theoretically the uterus should always be freely movable and the vagina does not require mobility during labor pains. The vagina is passively widened, which is not prevented by the fixation. The fixation above the symphysis pubis constitutes a fixed point promoting a descent of the fetus without a simultaneous descent of the vaginal wall. The period of expulsion may be rendered more painful, due to the pulling on the adhesions. Such complications may be prevented by sterilization or confining the procedure to women past the childbearing period.

The operation has been performed many times during the last ten years without a single recurrence. Should a recurrence occur then faulty technic is the cause.

The ventrofixation of the cervix, which Bumm published some time later, also attempts to place the point of suspension downward. It does not go sufficiently far downward, however, does not fully follow the principles expounded, and makes labor absolutely impossible. The ventrofixation of the vagina as described does not offer any technical difficulties. A trial of the operation is urgently recommended.

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Abtfeld: Rectal Examination. *Zentralblatt für Gynäkologie*, 1925, xlix, 4.

Rectal examination is not by any means as devoid of danger as is supposed, and in no way equals vaginal examination for the purpose of diagnosis. Proper use of the "Hot Water-Alcohol" hand disinfection will render vaginal examination safe and much more satisfactory than rectal examination.

LITTLE.



## A NEW SAGITTAL PELVIMETER

BY H. ACOSTA-SISON, M.D., MANILA, P. I.

(Associate Professor in Obstetrics, University of the Philippines)

IT IS useless for me to stress the importance of measuring the pelvic outlet in a primipara or a multipara with the history of prolonged labor. Klien,<sup>1</sup> Williams,<sup>2</sup> Daniels<sup>3</sup> and others have repeatedly demonstrated its value as a guide in the proper management of labor in a given case. McCormick<sup>4</sup> gives an exhaustive review of the subject in the June number (1926) of the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY.

The engagement of the head is a satisfactory indication that the pelvic inlet is obstetrically efficient, but it does not imply that the pelvic

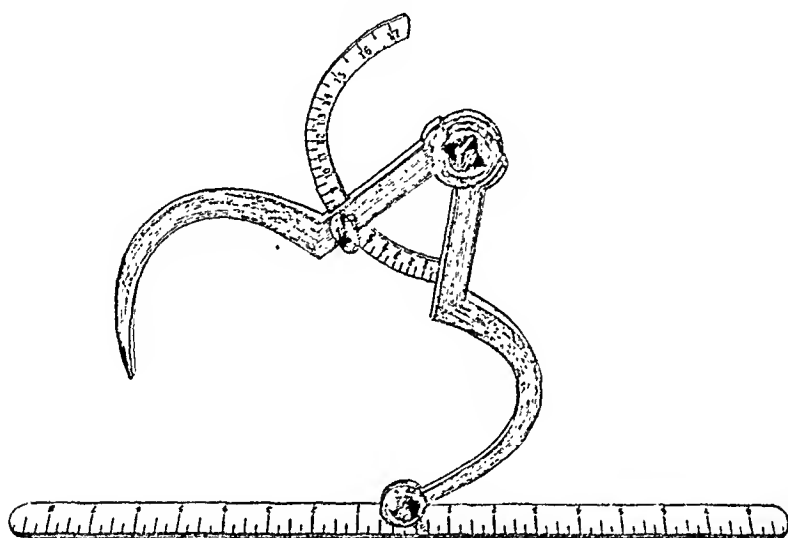


Fig. 1.—Acosta-Sison pelvimeter.

outlet is equally efficient to allow the birth of the head by the natural route.

On studying the table worked out by Williams in his textbook, one can safely establish a guide that as long as the transverse diameter and the posterior sagittal diameter together measure 15.5 cm. spontaneous labor is within the limit of possibility, and if the sum of both diameters is below 15.5 cm. spontaneous labor is out of the question. I believe that to remember this is easier than to memorize each number of centimeters that the posterior sagittal must elongate for every centimeter or half a centimeter of contraction of the transverse diameter.

Daniels has a somewhat different method of approaching the subject though the result is about the same. He determines the area of the posterior triangle of the outlet and by it he may prognosticate the

possibility of spontaneous labor. Multiplying the transverse diameter by the sagittal diameter and dividing the result by 2, will give the area of the posterior triangle. His formula is as follows:

$$\frac{\text{Transverse} \times \text{posterior sagittal}}{2} = 55 \text{ cm.}$$

or the normal area for an American woman. He claims that a posterior triangle having an area of 33 cm. may allow spontaneous delivery of the child.

In the paper on pelvimetry and cephalometry among Filipino women by Acosta-Sison and Calderon,<sup>5</sup> it is shown that among Filipinos, 47

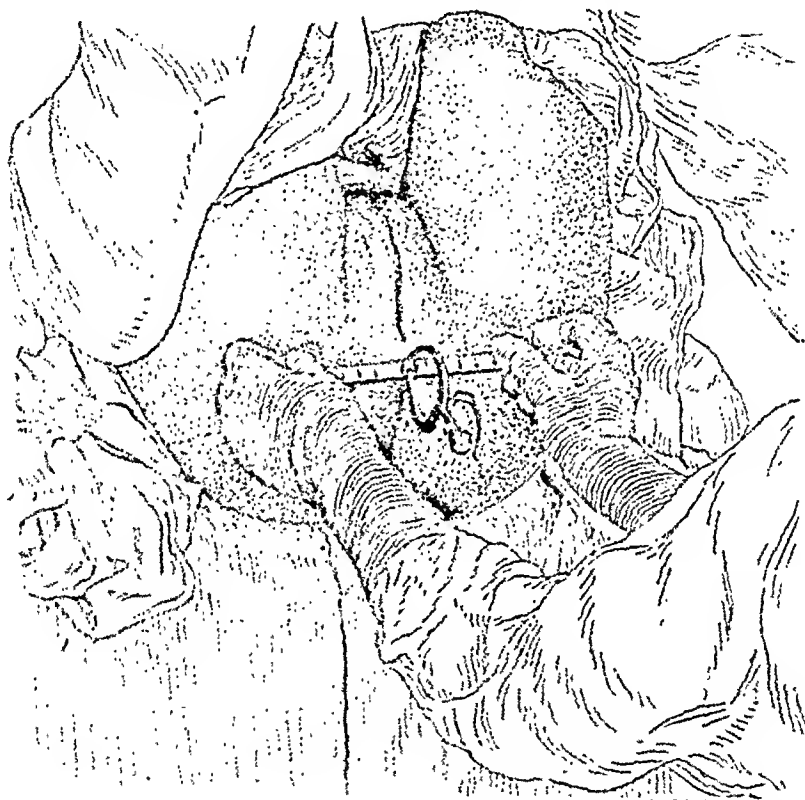


FIG. 2.—The bar may be used to measure the Intertrochanteric diameter.

is the normal area of the posterior triangle of the outlet and that this area may be reduced to as low as 31 and yet spontaneous delivery might still be possible.

The small posterior triangle given by Daniels and the even smaller measurements of Williams, which according to him will admit the possibility of spontaneous labor, may be a safe guide only when the child is small. If it is of the average size, forceps might be necessary to prevent prolonged pressure and the frequent pounding of the uterine pains on the head. When the baby is above the average size, it is doubtful that with such small measurements, the child can be extracted without deep asphyxia that will ultimately end in death.



Fig. 3.—The manner of taking the posterior sagittal diameter.

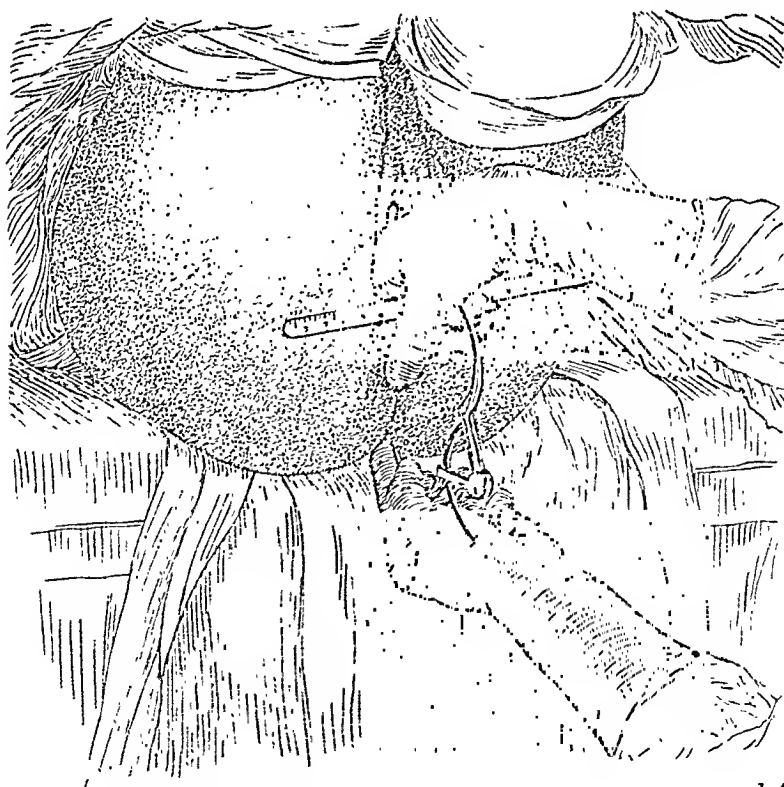


Fig. 4.—Technic of feeling for the articulation between the sacrum and the coccyx.

To measure conveniently the posterior and anterior sagittal diameters which extend respectively from the midpoint of the intertrochanteric diameter to the point of the sacrum and from the midpoint of the intertrochanteric diameter to the inferior border of the symphysis, the sagittal pelvimeter herewith presented has been devised.

The instrument consists of a flattened crossbar which is long enough to be fixed against the ischial tuberosities. In the midline of the bar is attached the revolving end of one arm of the pelvimeter. With the crossbar fixed against both ischial tuberosities, the pelvimeter may be made to measure the posterior sagittal diameter and without moving the crossbar from its place, the pelvimeter may be turned forward to measure the anterior sagittal diameter.

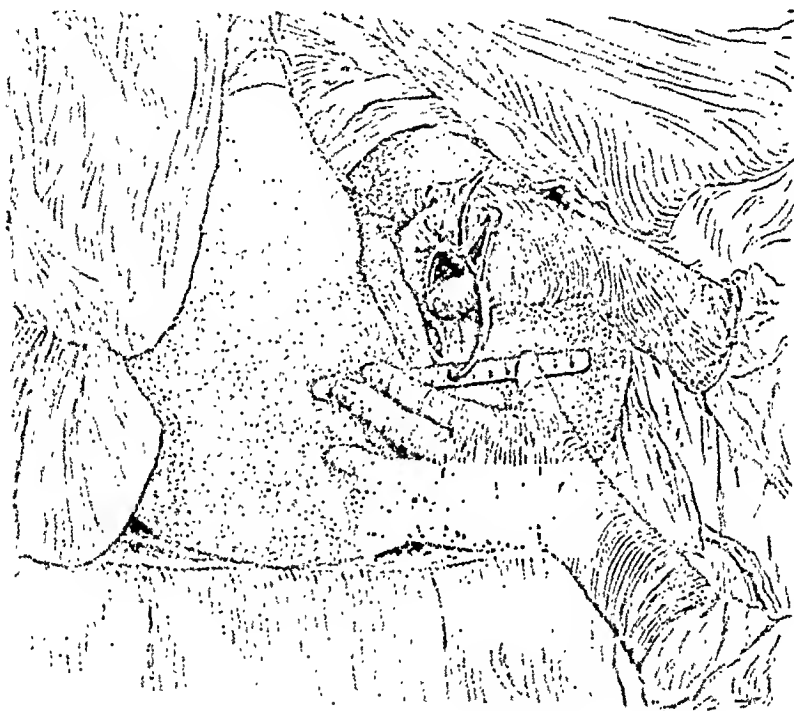


FIG. 5.—Measurement of the anterior sagittal diameter.

The crossbar is also graduated into 0.5 to 1 cm. so that it may be used to measure the intertrochanteric diameter. As it is marked from the middle outward, the number registered by the measuring thumb should be multiplied by two in order to get the full measurement of the transverse diameter.

My technic of its use is as follows: The patient is placed on a high table in the lithotomy position with the buttocks at least 12 cm. beyond the edge of the table so that the lower portion of the sacrum may be felt. The thighs with bent knees should be acutely flexed over the abdomen and held in place by straps or by assistants. In this position the outlet is well exposed.

After previous sterilization of the external genitalia including the ischial tuberosities and lower part of the sacrum the tuberosities as well as the sacrum should be well dried with a sterile towel to prevent the crossbar from slipping. After drying both hands, the right hand

adjusts the crossbar against the ischial tuberosities in such a manner that the pelvimeter is exactly in the midline while the left hand feels for the tip of the sacrum and applies thereto the end of the pelvimeter.

The distance between the two points, namely, the midline of the intertrochanteric diameter and the tip of the sacrum constitutes the posterior sagittal diameter. If there is doubt in the location of the tip of the sacrum, the right finger is introduced into the vagina and the coccyx is moved up and down between the two fingers until its articulation with the sacrum is reached.

The anterior sagittal diameter is measured by swinging the free arm of the pelvimeter to the inferior border of the symphysis.

If the above directions are carefully followed, no difficulty should be encountered in taking the sagittal diameters. No assistants are necessary except those who will have to keep the thighs flexed.

Thanks are due to M. Ligaya for the drawing of the illustrations.

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## PNEUMONIA AS A SEQUEL TO ANESTHESIA\*

By M. PIERCE RUCKER, M.D., RICHMOND, VA.

WHEN our Secretary assigned this subject to me, Woodrow Wilson's favorite limerick came at once to mind:

I never saw a purple cow.  
I never hope to see one,  
But, I can tell you anyhow,  
I had rather see than be one.

This subject is of more than academic interest. As Featherstone says, it is the one condition that starts, runs its course, and ends while the patient is under hospital observation. I have been greatly interested in the history of this complication. In the early days of anesthesia, the surgeons operated with great rapidity. They had been trained on struggling patients who were held by brute force, and were not required to be thoroughly relaxed. The anesthetist was timid and was concerned chiefly with rendering the patient insensible. Dr. Cook has given us a description of the first major operation in Europe under ether anesthesia. "The patient was a man

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of thirty-six years, suffering from a disorganized knee joint and it was decided to amputate. The mouthpiece was applied by Squire and the patient soon sank into insensibility. " " " Lister rapidly completed the operation in twenty-five seconds, according to Palmer, the dresser. The inhalation had been stopped as the operation was begun. On coming around the patient tried to lift himself, and asked when the operation was going to begin." There seem to have been no pulmonary complications at this period. The professor of surgery at Harvard (Cheever), writing in 1884 upon some of the dangers and disadvantages of anesthesia, makes no mention of any lung complication nor are any mentioned by H. C. Wood in the section upon the "after-effects of anesthesia" in Dennis' *System of Surgery*, in 1895.

The experimental period in anesthesia was followed by one of greater confidence. The surgeon became more deliberate and searching in his work. The anesthesia was entrusted to an interne, who was more afraid of incurring the surgeon's displeasure by not relaxing the patient sufficiently than he was of giving too much anesthesia. I can find no good description of an operation during this period, but that is not necessary. We all have seen the deeply unconscious patient, wet with sweat and possibly also with vomitus, placed flat on his back upon a stretcher and wheeled through cool and often draughty corridors, and put to bed in care of the ward nurse who was not particularly interested in the patient so long as he did not roll off of the bed or was not too noisy. Silk refers to the rarity of postoperative pneumonia in 1897. In 60,244 anesthetics there were 41 cases of pneumonia (0.06 per cent), but by 1906 the incidence of postoperative pneumonia was 3.09 per cent in 28,093 operations.

Finally we come to the third or modern period. The surgeon is still painstaking, but so is the anesthetist. He studies his patient, chooses the most suitable anesthetic, and uses no more of it than is necessary. When the patient leaves the table, the anesthetist sees that he is placed on his side, if that is possible, or at least that the head is turned to one side. He sees that the patient is properly covered while being transported, and that he is put in a warm bed in the care of a special nurse. With such attention pulmonary complications are rare. (Henderson, Magaw, Herb, etc.)

When we come to consider the etiology of postanesthetic pneumonia, we are at once confronted with our very hazy ideas concerning that of any form of pneumonia. About all we are certain of is that it is apt to occur in the presence of any killing disease, be it medical or surgical, and that it has a seasonal variation. When I was a medical student, I was taught that in the winter months some 20 per cent (Stillman says that 60 per cent have Type IV pneumococci) of healthy persons carried virulent pneumococci in their throats. Suppose one of the 20 per cent went duck hunting and came down with

pneumonia several days later. His friends say that he caught pneumonia while duck hunting. The scientific medical man talks vaguely of lack of individual immunity and of lowered resistance. Until we know more of pneumonia in general we cannot speak in very definite terms concerning the ways in which postanesthetic pneumonia arises.

First let us define postanesthetic pneumonia. What is it and what is it not? My colleague, Dr. Willis, tells of going to a distant city to do a herniotomy. A date convenient to the patient and his doctor was set. The doctor met him at the depot with the news that the patient had just had a chill. The next day it was very apparent that he had pneumonia. Of course such a case is not a postanesthetic pneumonia, as there was no operation, but had the day for the operation been set two days earlier as it well might have been, the case would most certainly have been classed as a postanesthetic pneumonia. A dentist removes teeth under a general anesthetic, a lung abscess follows and the anesthesia is blamed (Peters).

On the other hand, a laryngologist removes a pair of infected tonsils under local analgesia (Porter), and the patient develops a lung abscess. Although such a complication might well be considered a post-operative one, it is hard to see how the anesthetic had anything to do with it. But let a surgeon attack an infectious process in the upper abdomen and set free in the blood stream a number of tiny emboli that lodge in the lungs and the case is classified as a postanesthetic complication. Suppose, however, our Fellow, Dr. Farr, does the same thing under local analgesia. Would the lung complication be a postanesthetic one?

Yet regardless of terminology there is a very definite association between lung complications and surgical operations. Many large surgical clinics are reporting a surprising number of such complications. Cutler and Hunt show that one patient out of every 30 to 50 operated upon develops some pulmonary condition and one-fifth of these die from such a complication. And the frequency of these complications seems to be increasing as more attention is directed towards them. This is explained partly at least by greater diagnostic acumen, but it also shows that our knowledge of the factors involved is far from satisfactory.

It seems unwise to limit the attention to any one pulmonary complication. Not only is it difficult always clearly to differentiate the clinical types, but there is considerable evidence that they have common causative factors. The study of one group often throws some light on the other groups. The reporting of all pulmonary complications makes comparisons between various clinics easier.

The pneumonias, lobar and lobular, are the most important both from the standpoint of frequency and mortality. Armstrong reports 14 cases of lobar pneumonia with 9 deaths and 16 cases of lobular

TABLE I. SHOWING THE NUMBER OF CASES AND THE NUMBER OF DEATHS FROM THE VARIOUS POSTOPERATIVE PULMONARY COMPLICATIONS IN SEVERAL LARGE SURGICAL CLINICS

COMPLICATIONS	PORTER WEST BRIGHTMAN HOSP. (PORTER AND HUNT) 1,562 CASES	MASS. GENERAL HOSP. (CUTLER AND MORTON) 3,490 CASES	MONTREAL GENERAL HOSP. (ARMSTRONG) 2,500 CASES	LAKEVIEW HOSPITAL (BOBB AND DITTRICK) 1,007 CASES*	MAYO CLINIC (DECKMAN) 16,317 CASES
Lobar pneumonia	4	19	14	0	43
Bronchopneumonia	21	21	16	5	19
Bronchitis	17	7	19	18	72
Pleurisy	0	5	6	9	55
Empyema	1	2	0	0	1
Pulmonary embolus	3	6	0	0	7
Lung abscess	2	0	0	0	0
Mediastinitis	0	3	0	0	0
Pneumothorax	0	2	0	0	0
Excystation of tuberculosis	5	0	0	3	0
Acute congestion	0	0	0	0	21
Total	55 1 in 28.4 1 in 142	65 1 in 53.7 1 in 101	55 1 in 45.5 1 in 78	35 1 in 28.8 1 in 201	218 1 in 75 1 in 1088

\*Abdominal operations in the gynecologic service.  
in the text 3 cases of pleurisy proved and 3 cases of bronchopneumonia.



pneumonia with 13 deaths in a total of 55 pulmonary complications. Cutler and Hunt, also in 55 cases, report 4 lobar pneumonias with no deaths and 21 bronchopneumonias with 8 deaths. Beekman's proportion of lobar and lobular pneumonia also varied; in 83 pulmonary complications, there were 12 lobar pneumonias and 7 bronchopneumonias.

Whipple has made a careful study of the bacteriology of post-operative pneumonias and finds that the Type IV pneumococcus is almost always the organism involved, giving rise to an atypical pneumonia with a relative low mortality. Cleveland concludes that Type IV pneumonia is a definite entity and differs from Types I, II or III. The relative and varying frequency of the other lung complications in the series reported from the Peter Bent Brigham Hospital, Montreal General Hospital, the Mayo Clinic, the Massachusetts General Hospital and Lakeside Hospital is shown in Table I.

TABLE II. POSTOPERATIVE DEATHS FROM PNEUMONIA

HOSPITAL	AUTHOR	YEAR	
Johns Hopkins*	Wright	Prior to 1903	1 death in 1500.0 operations
Lakeside Hospital*	Robb and Dittrick	1906	1 death in 335.6 operations
Montreal General Hosp.	Armstrong	1906	1 death in 113.6 operations
Mayo Clinic	Beckman	1910	1 death in 731.4 operations
Mayo Clinic	Beckman	1912	1 death in 972.5 operations
Mayo Clinic	Beckman	1913	0 death in 6825.0 operations
St. Luke's Hospital	Derby	1915	0 death in 3125.0 operations
Roosevelt Hospital	Booth	1916	1 death in 373.1 operations
New York Hospital	Baneroff	1916	1 death in 201.9 operations
Mass. General Hosp.	Cutler and Morton	1915-1916	1 death in 158.6 operations
Presbyterian Hosp.	Whipple	1918	1 death in 148.7 operations
Peter Bent Brigham	Cutler and Hunt	1919	1 death in 195.2 operations
Mt. Sinai Hospital	Elwyn	1921-1922	1 death in 146.1 operations
Mt. Sinai Hospital	Elwyn	1922-23	1 death in 236.0 operations

\*Gynecologic service.

Recently another postoperative pulmonary complication has been described; i.e., massive collapse of the lung. It was first described by Pearson-Irvine, who noted the condition in a case of diphtheria with respiratory paralysis. Later Pasteur also described it as complicating postdiphtheritic respiratory paralysis and he was the first to note that it followed operations upon the abdomen. In the World War it was a frequent complication of chest injuries. It has also occurred in apparently well persons, without any trauma or operation. Tidy reports a case in which an acute pleurisy was the only discoverable cause. Rigler reviewed the chest films of 285 cases of ordinary pneumonia and found two cases in which collapse of the lung could be demonstrated. The condition has a very definite symptomatology; sudden onset, rapid breathing, dyspnea, fever, expectoration, with

subsidence by lysis in three or four days. The physical signs are very similar to the pneumonitis described by Whipple except that the heart and trachea are displaced towards the affected side. The mechanism of the production of the collapse is obscure. Pasteur insisted that it was an active process, accomplished with patent bronchioles. Elliot, and Dingley believe that the air from the affected area is absorbed by the blood after the bronchioles are sealed off with a purulent exudate. They cite animal experiments to show that plugging of a bronchus produces such a condition, but animal experimentation is not necessary, as Jackson and Manges have shown identical chest pictures following occlusion of a bronchus by a peanut or like foreign bodies. Gwyn reports the collapse of both lungs following blocking of the trachea with a blood clot. In one of Lee's cases autopsy showed a definite occlusion of the bronchus by a plug of mucus. Jackson and Lee report a case of postoperative collapse of the lung that was promptly relieved by removing tenacious secretions through a bronchoscope. Scott, who reviewed all the reported cases, was of the opinion that the closure of the bronchioles was brought about by some sort of reflex action either (1) a vasomotor effect upon the blood vessels, (2) contractions of the bronchioles, or (3) an edema of the mucous membranes somewhat analogous to angioneurotic edema. Whatever its causative mechanism, he believed it was a definite clinical entity and that it was often undiagnosed. He reviewed the twenty cases diagnosed as postoperative pneumonia in the Peter Bent Brigham Hospital in the years 1922 and 1923. All had at least one chest film. Three were undoubtedly cases of massive atelectasis. In five others there were signs strongly suggestive of this condition, but for lack of control films an absolute diagnosis could not be made. He predicted that the condition would be found oftener if looked for. Scrimger reports seven cases in 540 operations. Tront has recently reported four cases, all following appendectomies.

The symptomatology of these various postoperative chest conditions has been well described by Whipple, Burnham, Scott, and others. I take it that I had better use my allotted time in discussing the many causative factors, and the different means of prevention that have been advanced. At first it was supposed that the irritating effect of ether answered the whole question and the term "ether pneumonia" is in common use even today. The rivalry between the advocates of various devices for administering ether and also between the devotees of ether and chloroform was responsible in a measure in fixing the odium so firmly to ether. Anyone could see that ether caused increased saliva and must therefore be irritating to the air passages, and a mass of animal experiments showed that ether caused pneumonia. Further experiments, however, showed that ether was irritating to lung tissue only when its concentration was too great. Intra-

tracheal administration of ether seems to cause no irritation of the bronchi, and there have been reports of inhalations of ether actually curing bronchitis. Furthermore statistics from clinics that use chloroform largely, show just as many pulmonary complications. Even operations under local analgesia have been followed by pulmonary complications. In Mikulicz' clinic they have followed analgesia more frequently than inhalation anesthetics. Elwyn reports from Mt. Sinai an incidence of postoperative pneumonia in herniotomies under general anesthetic of 4.5 per cent and under local analgesia of 8.1 per cent. Cutler and Hunt's morbidity percentages were as follows: 3.39 per cent for ether, 4.24 per cent for gas-oxygen, and 1.63 per cent for procaine.

Most of the "bad-risk" patients in their series were given gas-oxygen. The opinion seems to be growing that neither ether nor any other anesthetic agent, unless badly administered, plays a part in the causation of the postoperative pulmonary complications. Considerable discussion has taken place as to the method of administration. Gateh for instance is convinced that when properly done the closed method is followed by fewer pulmonary complications. Most observers (Magaw, Boothby, Bevan, Keen, Herb), however, favor the open method for giving ether. Featherstone states that the intra-tracheal method has reduced the risk in operations upon the tongue and jaw. In twelve months there has been no pneumonia in his service following this method of administration. He attributes this improvement to (a) chance, and (b) permitting the cough reflex to return before withdrawing the catheter.

Herb quotes Silk, after an inspection of nearly 200 hospitals during the war, as being struck by the great variation in pneumonia following the work of different surgeons. In looking up the original reference I find that Silk was referring to poor ventilation rather than poor work. Perhaps this phase of the question has not been sufficiently emphasized.

Climate seems to play a minor rôle, although Riley states that he never sees postoperative pneumonia in Cuba. Seasonal variation, however, is significant. Whipple, Cutler and Morton, Cutler and Hunt, Armstrong, and Robb and Dittrick all report a greater incidence in the winter months. Cutler and Hunt believe that the character of the clientele is an important factor. Large city hospitals have more septic and traumatic work to do. The necessity of taking a 200 or a 1000 mile journey on the train automatically eliminates the serious acute surgical emergencies. On the other hand Wilson states that in the first ten years of the Mayo Clinic there were no pulmonary emboli, whereas after that there was one case in 2331 operations. He explains this increase in part at least by the fact that they were getting more "last resort" cases.

Age seems to be a minor factor. Most of Whipple's cases were between thirty and forty years. Cutler and Morton conclude that age, anemia, alcoholism, arteriosclerosis, weak heart, or susceptible lungs are important predisposing factors.

Pneumonia generally is more prone to attack men than women. Osler gives the ratio as 42 to 33. The ratio, however, in men and women who have undergone abdominal operations is much greater than this, partly, it is believed, because the respiration being of the abdominal type in males, is more interfered with by the operation.

Such factors as the posture, the preparation, and the care of the patient immediately after the operation, have been discussed by many writers at great length. Except that the Trendelenburg position is less favorable to the aspiration of septic material from the mouth, posture is a small factor. Much greater stress is laid upon not chilling the patient either in his preparation, during the operation, or in his transportation from the operating room. (Armstrong, Cleveland, Homans, Keen, Robb and Dittrick, Mudd and Grant, Booth.)

Whipple found a history of previous inflammatory changes in the lungs in 25 per cent of his cases. Cutler and Morton placed great stress upon preexisting lung pathology. Twenty-six of their 65 cases with postoperative lung complications showed some definite lung pathology at the time of operation. However, in a later paper, Cutler and Hunt do not lay so much stress on preoperative pulmonary lesions but find that the chief factor is embolism. The importance of preexisting sepsis is seen in a new light. Miller, Gee and Horder, Homans, Ranzi, Burnham and others have also pointed out the importance of infection in the production of postoperative pneumonias and pleurisy. The site of operation has great bearing upon the frequency of lung complications. It is generally agreed that these complications occur with greater frequency after abdominal operations, especially those upon the upper abdomen. This is well shown by Elwyn's figures from Mt. Sinai where, in 1921 and 1922, 2.76 per cent of 2,932 operative cases were followed by pneumonia, whereas 6.29 per cent of the operations upon the upper abdomen and 13.8 per cent of the operations upon the stomach were followed by pneumonia. In Armstrong's series, 27 cases of lung complications occurred in 371 cases of septic peritonitis (7 per cent). The only group that exceeded this was the 39 trephining operations in which pneumonia occurred in 20.5 per cent. He explains this high incidence by the long-continued coma which often lasted several days. Many of these head cases got very little anesthesia. Cutler in his many studies of post-operative pulmonary complications has come to the conclusion that the mortality of the site of operation explains the great predilection of upper abdominal lesions to pulmonary complications. Small emboli are more apt to be set free to lodge in the lungs. The location of the

lesions in the lung further supports this theory as it coincides with the usual location of demonstrable pulmonary emboli.

It is difficult to evaluate the various predisposing factors. One author stresses one cause and another a different one, while others mention a great many factors. A positive way to get at this would be to follow the results of eliminating various factors. Unfortunately this is not always stated when good results are obtained, and very often several factors are eliminated at once. Often the data are insufficient to draw any conclusions. For instance, Herrmann suggested the use of strontium intravenously as a preventive of post-operative pneumonia. He had tried it upon ten patients. Kolodny has changed the site of hypodermoclysis from the pectoral region to the thigh, but does not give the results he has obtained. Mandl and Geist and Somberg got fewer lung complications when the patients were digitalized. Kelly, Otte, and Pfannenstiel recommend the thorough cleansing of the mouth, removing necrotic teeth and septic roots. Jackson thinks the abolishing of the cough reflex, "the watchdog of the lungs," by a too liberal pre- and postoperative use of morphine is an important factor. Boothby had a decided lowering in morbidity and mortality at the Peter Bent Brigham Hospital when the patients were kept in warm recovery rooms under the care of special nurses. Cutler and Morton state that Pfannenstiel and Otte were successful in abolishing pulmonary complications entirely by careful selection of cases, good risks, careful anesthetics by the same trained anesthetists, operations by the same group of surgeons, etc.

#### CONCLUSIONS

A study of the literature would seem to indicate that the term "ether pneumonia" is a misnomer. In fact anesthesia probably plays a minor rôle in the causation of postoperative lung complications except that it permits extensive operative procedures upon septic and debilitated patients. After due allowance is made for aspiration of septic material, the lighting up of a preexisting process in the lungs, the chilling of the patient on the table and before he recovers consciousness, there remain a considerable number of pneumonias and pleurisies that are best explained by septic material from the operative field lodging in immobilized lung tissue.

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## THE PATHOGENESIS OF PEMPHIGUS NEONATORUM\*

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**P**EMPHIGUS neonatorum is an epidemic, vesicular, staphylococic dermatitis occurring in the newborn. It is characterized by the appearance of red maculae anywhere on the body which in a few hours, become blebs filled with a clear fluid, later becoming purulent, and with a fine covering which ruptures spontaneously in a few hours, as a rule leaving a reddened weeping surface which gradually heals over and disappears without scar formation. The lesions are usually multiple and vary in size from one to several centimeters in diameter.

The disease is highly infectious and spreads through a nursery very rapidly if not prevented by immediate isolation of babies developing suspicious lesions. Adults may be affected by contact with infected babies. Thus nurses may develop lesions on the hands and arms and mothers frequently develop blebs on the breast.

Fatal cases occur and these usually are associated with lesions involving the abdomen from which infection spreads to the umbilical cord and results in a staphylococic septicemia. Other fatal cases have so extensive an involvement of the skin, that the condition resembles an acute exfoliative dermatitis.

Epidemics occur in various institutions from the carefully regulated maternity hospital with separate pavilions for infected cases, to the general hospital where little attempt is made to separate maternity cases from patients affected by various medical and surgical conditions. Isolated cases have been noted in private homes, especially when epidemics were occurring in the hospitals of a given city (Krigbaum<sup>1</sup>).

Tropical climates are more favorable for the development of the disease than temperate climates. Thus Clegg and Wherry<sup>2</sup> report that practically every white child born in the Manila Hospital develops pemphigus. The effect of race is shown in their report which stated that the native children were practically never affected.

In this climate the worst epidemics that we have observed have occurred in the summer time, although we have seen epidemics start in November, December and March.

There has been considerable divergence of opinion as to whether a streptococcus or a staphylococcus is the etiologic factor from a bac-

\*Read at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, held in Chicago, Ill., September 22, 1926.

teriology standpoint. Sabaraud<sup>3</sup> is of the opinion that the former is the exciting organism but he adduces no bacteriologic evidence in support of his claim. On the other hand the writer<sup>4</sup> has shown that a pure culture of *Staphylococcus aureus* obtained from a lesion fulfilled all of Koch's postulates with regard to the disease. He produced a typical lesion on his own arm, and recovered the staphylococci from the experimental lesion in pure culture. This organism culturally and tinctorially was indistinguishable from a strain of staphylococcus recovered from an ordinary boil.

The isolation of this organism from all unruptured lesions, the nature of the lesions and the rapidity of spread from one baby to another in the nursery clearly demonstrates the epidemic nature of the disease. However, the origin of the epidemic in a given instance is not so easy to demonstrate.

We see, for example, an institution under competent management function for months with no evidence of pemphigus. Suddenly, a typical lesion appears on one of the babies. From this an epidemic of typical cases can start. Where does it come from? It was with the hope of throwing some light on this point that we investigated the circumstances surrounding the appearance of lesions in our nursery during the last few years.

Assuming that our bacteriologic observations have been correct, and that a *Staphylococcus aureus* causes the lesions, we must naturally consider where the source of such infection might be. Also we should try to decide whether nonpemphigus lesions such as a boil for example, can give rise to a typical pemphigus lesion, which in turn can start an epidemic?

We made several observations which convinced us that such was very probably the case. We will describe several instances which seem to point clearly to the origin of the primary cases which we have observed in the past few years. An epidemic broke out among the babies in the nursery of the County Hospital in the spring of 1920. No active cases had been seen for several months and no contacts, as far as could be traced. Several babies were infected and on investigation it was discovered that the woman who assisted the night nurse in distributing the babies for the evening and early morning nursing had marked pustular acne lesions on her back and arms. These were discovered after she herself had been delivered a few days. Her baby developed pemphigus and after isolating them both no further cases developed.

A sporadic case developed in the nursery at the University of Iowa. On investigation it was found that the interne on the service had a small boil on the back of his neck. The baby was isolated and the interne excluded from the ward and no further cases developed.

One of the instructors, demonstrating engorged breasts in a newborn baby, expressed some of the "hexemilch." A few days later



a suppurative mastitis developed, was opened and a *Staphylococcus aureus* isolated. Within twenty-four hours a typical pemphigus lesion developed about an inch from the breast and from this lesion a *staphylococcus aureus* was found on smear and culture. Fig. 1 shows the lesion.

The converse of this was seen in the case of a young mother whose baby was born in the Chicago Lying-In Hospital during an epidemic of pemphigus. On the sixteenth day, two days after leaving the hospital, the baby developed pemphigus lesions on the abdomen and groins. Shortly thereafter the mother developed typical lesions on her breast, and a few days later developed an acute mastitis with a temperature of 102° F. Suppuration did not occur, and unfortunately no cultures of the milk were made.



Fig. 1.—Pemphigus lesion developed secondary to a suppurative mastitis.

A mother who had healing acute pustule lesions on the arms and an active herpes simplex on the lower lip, delivered normally. On the third day her baby developed a pustular lesion at the root of the nose which was diagnosed as impetigo. The next day typical pemphigus lesions appeared on the face of this baby a short distance from the original pustule. The *staphylococcus* was demonstrated in the fluid from these lesions. Our interpretation of this case is that the mother who had a *staphylococcus* dermatitis and a herpes which probably harbored the *staphylococcus*, kissed her baby and produced the impetigo lesion. Organisms from this lesion produced the pemphigus lesions on other parts of the body.

From a consideration of these cases the following conception of the pathogenesis of this disease presents itself. The *Staphylococcus*

aureus, particularly one which has been producing skin lesions, may, when coming in contact with the skin of the newborn under certain conditions, give rise to typical pemphigus lesions.

The recent literature on this subject contains two papers that suggest a similar idea. Mellon and Caldwell<sup>5</sup> found pure cultures of staphylococci in the breast milk of mothers whose babies had pemphigus. Not all of these had clinical mastitis. Fractional pumpings revealed practically the same number of organisms in the separate samples indicating their presence in the deeper structures of the breast as well as in the ducts. They disregard the possibility of a pemphigus baby being the source of the breast contamination. They do not believe that pemphigus is a contact infection because the lesions in their cases developed elsewhere than on the face. They conclude that staphylococci occur in human breast milk. Changes in virulence might make them capable of starting an epidemic of pemphigus. Any strain of staphylococci might do the same thing. The fact that the organisms might have entered the breast secondary to the pemphigus seems to weaken their argument.

The cases here cited have been sporadic and were not followed by epidemics. This is probably due to several factors. The nursing personnel of our department is trained to report every suspicious lesion on a baby's skin as soon as noted. Every suspicious case is isolated for several hours for observation. A lesion that takes longer than a few hours to develop into a pemphigus bleb is not pemphigus. All blebs are painted with alcohol and opened as soon as formed and dressed with a 2 per cent white precipitate ointment. Finally an immediate search of the ward and personnel is made to discover and eliminate any possible source of staphylococcus pus contamination.

Roy E. Krigbaum studied a series of epidemics occurring in three of the Columbus, Ohio, hospitals. He found staphylococci in all cases. He was unable to infect his own skin or to transmit the infection to another part of an infected baby by rubbing it into the skin or to inoculate an uninfected baby by direct contact. He found, however, that hospitals having epidemics were using liquor cresolis compositus as antiseptic solution in the delivery rooms. On analyzing this solution it was found to be highly alkaline. He suggests that this might chemically injure the skin of the newborn sufficiently to permit the staphylococci to gain entry to the skin.

These suggestions are important as to possible contributing causes and in some instances may be the only cause acting. We believe, however, that in all probability staphylococci derived from other skin lesions such as acne or boils are more commonly the source of these epidemics and should be searched for and eliminated as a possibility in every epidemic. The older literature on the treatment of this disease confines itself almost exclusively to the care of the lesion in active

eases, the importance of isolation of the infected cases, and sanitary measures for combating reinfection from the wards, bed linen, and nursery equipment. The important point of the original source of the epidemic was completely overlooked and, therefore, the liability of reinfection from the same or similar source is obvious.

#### CONCLUSIONS

The following conclusions seemed justified from consideration of this data:

1. Epidemics of pemphigus neonatorum arise in babies who have not as far as can be demonstrated come in contact with other cases of pemphigus.

2. The lesions of pemphigus neonatorum are constantly found to contain a *Staphylococcus aureus* which fulfills all of Koch's laws with respect to this disease.

3. Culturally and tinctorially these staphylococci are indistinguishable from other strains of staphylococci isolated from other skin lesions.

4. Other skin lesions due to the *Staphylococcus aureus* are frequently found in connection with primary cases in an epidemic of pemphigus.

5. It is probable that *Staphylococcus aureus* from lesions other than pemphigus may produce typical pemphigus lesions and be the starting point in an epidemic of this disease.

6. On the appearance of a sporadic case in a maternity active search should immediately be instituted for skin lesions among the attendants and any suspicious carriers excluded from the nursery.

7. No individual having an active pustular skin lesion should be allowed in a nursery or to come in contact with nursery linen.

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## CAN QUININE KILL THE FETUS IN UTERO?

BY GEORGE GELMHORN, M.D., F.A.C.S., ST. LOUIS, MO.

(From the Department of Gynecology and Obstetrics, St. Louis University School of Medicine, and St. Mary's Hospital)

THE intensifying effect of quinine upon uterine contractions in labor was first observed in 1872.<sup>1</sup> Its use, usually with castor oil, for the purpose of inducing contractions is of much more recent date, and when Watson<sup>2</sup> proposed a definite formula for this combined medication, and Williams<sup>3</sup> endorsed the recommendation, the problem of safely inducing labor near term seemed to be solved. By this method, nothing could be lost and everything was to be gained. It was true that only in about 50 per cent of the cases was the attempt at starting contractions successful, but, on the other hand, no harm could come from it. I myself have told many a patient that the medication "if it did not help, would not hurt her."

Nor was there anything in literature to indicate otherwise. It was long known, of course, that in malarial countries abortions occurred very frequently, and this was attributed to the use of quinine. But this explanation is unconvincing. The disease itself may readily lead to interruption of gestation, and scientific investigators who, like Kochler,<sup>4</sup> approached the subject experimentally, emphatically deny that quinine is an abortifacient. In the two or three cases of malaria in pregnancy which I have encountered, I have administered quinine unhesitatingly and thereby, I believe, *averted* abortion.

However, the present discussion deals with the use of quinine at the end of pregnancy and here, too, the drug was absolved of any untoward by-effects. The only criticism DeLee<sup>5</sup> had to offer, was that it might lead to precipitate birth. Schwab<sup>6</sup> stressed the fact that quinine intensified contractions without making them tetanic. Hammond<sup>7</sup> gave 10 grains of quinine every half hour in the second stage until 30 grains had been taken, and observed stronger contractions but never any ill effects. Mäurer<sup>8</sup> administered 15 grains at a dose and gave up to 45 grains within twelve hours, and in some cases even more, without noticing any untoward influence on the child. The experiences of Marek<sup>9</sup> and Fülöp<sup>10</sup> can, likewise, be summarized in that quinine was not harmful to either mother or child. Bennett<sup>11</sup> used quinine in two cases of albuminuria with excessive edema. In the first case, convulsions occurred in the eighth month. Quinine was given in doses of 8 grains every four hours for twenty-four hours, in all six times. The second patient received 5 grains of quinine three times a day. *Both children were stillborn*, but it would obviously be too far fetched to connect the fetal death with anything but the toxemia.

In the entire, very voluminous literature on quinine in labor, I have been unable to find a single, clear-cut statement that the drug could affect the child in any way. Porak<sup>12</sup> seems to have been the only one who expressed a different opinion. He claimed that, after ingestion of quinine, the amniotic fluid is often found discolored and many children are born asphyxiated. Such children, if resuscitated, fail to nurse well. Guggisberg<sup>13</sup> challenges the correctness of these observations. His own studies have convinced him that the fetal heartbeats are never slowed down by quinine and that neither during nor after delivery need there be any fear for the well-being of the child.

In fact, there seems to be a remarkable tolerance on the part of the child even for large doses of quinine. Bailey,<sup>14</sup> for instance, gave 40 grains with perfect impunity.

If such unanimous optimism had created in me a sense of security, I was bound to be rudely awakened by the following experience.

On May 12, 1922, I delivered successfully a primipara of 27 years by means of cesarean section for placenta previa. After about three years of perfect well-being, the patient conceived again; the last menstruation occurred on Jan. 26, 1925. In the second month of this pregnancy, she suffered from an attack of hyperemesis which yielded promptly to appropriate treatment in the hospital. The remainder of the pregnancy was normal in every respect.

The child was apparently quite large, and as I wanted to prevent any undue strain on the uterine suture and avoid, if possible, a second cesarean section, I advised induction of labor two weeks ahead of full term. Consequently, on Oct. 28, 1925, the patient took four tablespoonfuls of castor oil at 7 A.M., and 10 grains of quinine at nine, eleven, and one o'clock, respectively, in all, 30 grains. *No contractions ensued.* The patient felt some ringing in the ears, but this soon passed off. The child seemed to be a little more lively at first, but towards evening all fetal movements ceased, and at no time during the following two and one-half weeks could the patient feel any motion. Nor was I able, in almost daily auscultations, to hear the fetal heartbeats.

Other signs of fetal death soon put in appearance. The abdomen became perceptibly smaller. The patient, heretofore the picture of splendid health and strength, felt nauseated for several days. Then, again, she was extremely tired, and later she had a complete loss of appetite. In the last day or two she also had a feeling of a heavy body within her abdomen, falling from side to side as she moved her position in bed, and experienced a number of "nervous chills." Objectively, temperature, pulse, and blood count were always normal, but her weight decreased by a few pounds and there was a trace of acetone in the urine. However, as there were no urgent indications, it seemed wise to postpone any intervention until the uterus should show a disposition towards ridding itself of the dead child. This did not happen until Nov. 12, that is, 15 days after the supposed death of the fetus, when the patient reported that she had some very dark discharge which was accompanied by a few cramps. A small Voorhees bag was then inserted through the closed cervix and a weight of one pound attached. Strong contractions occurred quite promptly but ceased as soon as the bag was expelled seven hours later. The uterus remained quiescent for more than twenty-four hours. Then strong contractions set in. After five hours of labor, the dilatation was found almost complete, though there was no entire effacement; both the internal and the external os could be felt, and the length of the cervical canal was about one-half an inch. The membranes had ruptured previously. A thick-walled sac protruded from the cervix and filled the upper part of the vagina. Within the sac, one of the occipital bones could be felt above the pelvic rim.

The patient was now placed on the delivery bed and, after careful disinfection, the narrow vagina was "ironed out" to admit the whole hand. The thick sac was recognized to be the scalp which had separated from the cranial bones and was filled with liquefied or softened brain substance. There followed a technically difficult extraction of the head by pull on the bones with vulsella. The broad shoulders resisted traction until both clavicles had been cut. The rest of the body followed easily. Much dark bloody discharge of an unpleasant odor escaped through tears and rents in the scalp.

The placenta was adherent and had to be removed manually. During this procedure, the scar of the cesarean section in the lower uterine segment could well be palpated; it was *strong and linear*. Pituitrin and ernutin were injected under the skin, and the uterus contracted readily with practically no loss of blood. There was no perineal laceration, and the patient was returned to her bed in a very good condition.

A most careful examination of the dead child and the placenta failed to show any cause of the death in utero nor did a postmortem of the fetus throw any light on the etiology of the accident.

The mother passed through an afebrile puerperium but required several months before she regained her former good health. The Wassermann test was negative.

Under these circumstances one is forced to conclude that the death of the child and the ingestion of quinine were not a mere coincidence, but that one resulted from the other. I am unable to explain the mechanism of this relationship at the present time. There are, however, animal experiments under way in my department for the purpose of studying more fully the effect of quinine upon the fetus in utero. Quinine, says Kobert,<sup>12</sup> is a typical protoplasmic poison which, in large doses, first paralyzes and then destroys all cells of the body. In the few fatal cases, however, enormous doses of between two and four teaspoonfuls had been taken. Kobert, too, though he touches on the subject of quinine in pregnancy, fails to record any deleterious effect on the fetus.

Yet, my case, though it seems to be the first reported in literature, is surely not the only one. When I narrated my experience in a small circle of friends a short time ago, two similar cases were mentioned in the conversation. I am deeply indebted to Dr. Joseph L. Baer, of the Michael Reese Hospital in Chicago, for permission to include in this report an analogous case observed by him. To Dr. Frank W. Lynch, of San Francisco, I am under great obligation for giving me the record of a case observed by him in the University of California Hospital. His patient was a iii-para of twenty-seven years in whom labor was to be induced very near term. Her Wassermann test was negative. On August 9, 1917, she received two tablespoonfuls of castor oil with 10 grains of quinine, and the quinine was repeated thirty minutes later. As no result occurred, the entire procedure was repeated on August 12 and again on August 14. No contractions ensued. On August 22, the entry shows that the patient had not felt life for several days and that the fetal heartbeats could not be heard. She was discharged at her own request and later delivered of a stillborn child by

a private physician. Dr. Lyneh writes: "This is the only case in which we have given so much quinine here in so short a time, although we gave as much in Baltimore in the treatment of malaria without interrupting pregnancy or causing fetal death. \* \* \* Our present rule is never to give two so-called 'cocktails' (castor oil with quinine) in the same week."

It will be seen that in this instance the amount of quinine employed in one day, was even less than in my own case.

It seems highly significant to me that here, without any special effort, three instances of fetal death probably due to quinine could be collected, although none had ever been recorded in the literature. It would be most desirable if similar experiences be reported so that one may gain an insight into the untoward complications that may result from the use of quinine for induction of labor.

#### SUMMARY

1. The popular method of induction of labor by means of castor oil and quinine is, according to the literature, an entirely harmless procedure which threatens no danger to either mother or child.

2. A personal experience is recorded where the usual dose of quinine was followed by intrauterine death of the child. The latter was expelled in a macerated condition seventeen days after castor oil and quinine had been administered for the induction of labor.

3. No cause for the fetal death could be detected by a thorough examination of the mother, the child, and the placenta.

4. The signs of intrauterine death occurred so promptly after the ingestion of quinine that a causal relationship between the two must be assumed.

5. Two analogous cases have been communicated to the writer by other observers. It seems, therefore, probable that similar accidents have occurred to others without finding their way into print. It would be highly desirable if physicians would report such experiences so that the possible dangers of the medication can be duly appraised. At any rate, it seems justifiable to sound a note of warning against the indiscriminate and copious use of quinine for induction of labor.

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## REPORT OF A CASE OF UMBILICAL CORD COILED FIVE TIMES AROUND INFANT'S NECK\*

By WALKER GOSSETT, M.D., LOUISVILLE, KY.

IN THIS report the term "coiled," instead of "looped," is used advisedly, since "a loop in the cord is a sling over a part of the fetus, while a coil must completely encircle a part of the fetus." The latter was the condition in the case here described.

It may be interesting to note that formerly the fetus seldom survived this accident, which induced the absurd belief among earlier writers that coiling of the funis around the neck represented "*sui-cidium fetus in utero*."

Mrs. R., aged twenty-four, para ii, was delivered of a girl baby weighing six pounds at the Saint Joseph Infirmary, Sept. 3, 1926. When the head was extruded, and the coiled cord noted the anesthetist was requested to give the mother oxygen. There was no pulsation in the cord. The baby was quickly delivered, suspended by its feet, and the cord rapidly uncoiled from about its neck. There were five distinct coils. The cord measured forty inches in length and contained many spiral twists resembling a corkscrew. These twists were not counted. The baby revived very quickly after uncoiling the cord, without artificial means of resuscitation except oxygen administered to the mother.

I have never, during thirty years of obstetrical practice, before seen more than three coils of the funis around the child's neck. In the case reported the coils were not tightly drawn and the cord was small in diameter, being about the size of an ordinary lead pencil.

The frequency with which the cord has been found encircling the neck of the child is variously stated by different authors. In 2200 cases Edgar noted the cord about the neck in 514, or 23.36 per cent. Other writers show the percentage as from 25 to 33. In statistics mentioned by Gardiner, embracing 35,712 cases observed by seven prominent obstetricians, coiling of the cord occurred once in every 3.6 births, and once in every 2.2 births it encircled the neck of the child.

The number of coils noted around the neck varies from a minimum of one to a maximum of nine. Instances are rare, however, in which more than three coils have been found. In Edgar's series it was coiled once around the neck in 19.77 per cent, twice in 3.15 per cent, and three times in 0.40 per cent. The same author states that he had a case in his own practice in which the cord was coiled seven times around the neck causing death of the child, and refers to another in which there were nine coils around the neck.

\*From the Louisville Post-Op.

\*Presented to the Kentucky Obstetrical Society, Louisville, Kentucky, Sept. 17, 1926.



## A CASE OF RUPTURED UTERUS DURING THE SECOND LABOR AFTER CESAREAN SECTION

BY P. E. THORNHILL, M.D., WATERTOWN, N. Y.

**I**N CONNECTION with a discussion of ruptured uteri, the following case is interesting because the scar withstood one very hard labor, only to rupture with the first pains of the succeeding one.

Age twenty, para iii, gravida iv, general health always good. Menstruations regular and normal. Married at sixteen.

First pregnancy, 1921, developed eclampsia in ninth month; classical cesarean by another surgeon; good recovery of both patients; no wound infection, and the nephritis seemed to entirely clear.

Second pregnancy, 1922, closely supervised at clinic, blood pressure and urine normal throughout. No weakness in the scar being evident and the child being in normal position with no disproportion, it was decided to allow her a test of normal labor. Her measurements were, interspinous 22.5; intercrural 27.5; external conjugate 20; bischial 9; and the diagonal conjugate not reached by an average finger. The membranes ruptured early. The pains were of good quality, there was no perceptible bulging of the scar, and no abnormal pain. The first stage was twenty-two hours in length, and she was allowed two hours in the second stage before midforceps were applied for arrested progress and exhaustion. The baby weighed nine pounds. Good recovery of both patients.

Third pregnancy, terminated in an abortion in the second or third month. I did not attend her during this illness and the cause of the accident cannot be determined. There appears to have been no infection, and recovery was prompt.

Fourth pregnancy, normal throughout except for considerable vomiting in the early months, and constipation. She attended clinic regularly. Date of expectancy was July 25, 1925.

The rupture occurred on July 8. For two days previous to this, she had had diarrhea of unknown origin. On this particular afternoon, she had walked a distance of two miles. Pains began about 6:30 P.M., moderately sharp. In an hour they became intense and she began vomiting. I saw her about 8 P.M.; she was evidently in great pain, attempting to vomit every two or three minutes, and pale but not perspiring. The abdominal muscles were not rigid, but she was very tender and the fundus could not be defined. The fetal head could be palpated floating above the pelvic brim; the fetal heart was not heard. There was no vaginal bleeding when first seen, but a little appeared later. The pulse was 100.

The first impression was that it was nothing serious, probably just an acute gastritis; but a little reflection upon the history and upon the condition of that fundus, together with a few minutes' observation of an increasing pulse rate, clamminess of skin, and beginning perspiration, shortly led to correct diagnosis, and we moved her to the hospital.

After preparation, a careful vaginal examination disclosed a slight bloody discharge, the cervix high and tightly closed, and the presenting part too high to be palpated. The hemoglobin was 75 per cent; reds, 3,200,000; blood pressure 132/80. Blood typing was done and a donor secured.

The abdomen was opened at about 10:30 P.M., through a low median incision. The peritoneal cavity was full of blood, and the child and placenta, in unruptured

membranes, were outside the uterus. Incision of the membranes over the child's head allowed the first fluid to escape. The fetal heart had ceased and efforts at resuscitation were unavailing. The child's weight was eight pounds two ounces.

The uterus showed a large three-cornered rent in the uppermost part of the fundus where there was a small band of omental adhesions. There were no extensive adhesions present. As repair seemed impossible, a hysterectomy was done. Saline by hypodermiclysis was given on the table, but transfusion seemed unnecessary.

On the following day, the hemoglobin was 40 per cent; reds 2,208,000; whites 9,300; polynuclears 77 per cent. The patient made a prompt recovery and is now in excellent health.

Why did the scar rupture with the first pains of this labor, instead of breaking with the hard second-stage pains of the previous one? Was it placental erosion this time that thinned and weakened the scar?

631 WOOLWORTH BUILDING.

## AN OBSTETRIC TAMPON

BY ALEXANDER M. CAMPBELL, M.D., F.A.C.S., GRAND RAPIDS, MICHIGAN  
(From the Grand Rapids Clinic)

THE hallmark of an obstetrician is the proper restoration of a badly injured birth canal, and in practically every case such injury should be repaired at the time it is sustained. In order to effect such a restoration one should be familiar with the surgical anatomy of the injured structures and be equipped with all the paraphernalia necessary to properly visualize and repair the lacerated parts and to



The tampon which is made by our surgical nurse is about the size and shape of a tangerine orange and consists of absorbent cotton compressed rather solidly and covered with gauze. Attached to the center of the "hilus" of the tampon is a strip of strong tape one-half inch wide and twelve inches long. These tampons are done up in packages of from four to six and are sterilized.

As soon as the second stage of labor is completed and while the patient is still under anesthesia one tampon or more is inserted into the vagina thereby occluding the canal, damming back the blood and making it possible to visualize the amount of injury that is sustained to all parts of the vaginal wall. With proper light and specula every portion of the vaginal canal distal to the tampon can be readily visualized; and all injuries can be repaired in a bloodless field with accuracy and with a minimum loss of time.

When repair has been accomplished the tampons are withdrawn and by that time the placenta is usually separated sufficiently so that the third stage of labor may continue uninterruptedly or with gentle assistance.

The use of the obstetric tampon avoids the accident of leaving loose sponges in the vagina during inspection and repair of parturitional injuries because the nurse is instructed to place a hemostat on the distal end of the tape before placing the tampon in the operator's hands, and after insertion of tampon the hemostat with tape attached is placed upon the patient's abdomen.

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## The Readers' Forum

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CONDUCTED BY JOHN OSBORN POLAK, M.D.

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### A New Department

IT is proposed to begin in the July number of the Journal a new department, THE READERS' FORUM, devoted to the problems of the practitioner of medicine in obstetrics and gynecology. Questions are solicited for reply and discussion from our readers, likewise criticism or comment on any original communication previously published in the Journal.

The Editors have instituted this venture in response to a popular demand and trust that readers of the Journal will avail themselves of the service offered.

The Department will be conducted by DR. JOHN OSBORN POLAK, and communications intended for the FORUM should be addressed to him at 20 Livingston Street, Brooklyn, N. Y.



represent the facts. Also, as Dr. Davis points out, the classification of deaths from puerperal causes differs greatly in different countries, so that higher rates of death do not necessarily mean a greater mortality.

The census report gives to Italy a total puerperal mortality of 40 per 10,000 births, with a puerperal sepsis of 16 per 10,000 births. It is apparent that as compared with these figures, and those of Denmark, whose Midwife Commission was inaugurated in 1714, and England since the passage of the Midwife Act in 1902, our maternal statistics, which still stand 68 to the 10,000 births, are woefully excessive.

This is the situation not only in the United States, where, as the Secretary of the Health Department of North Carolina points out, a quarter of a million of women in the rural districts of the south are still delivered by the 50,000 untrained, unregistered, ignorant, negro midwives, but also in Canada where there are practically no midwives. Denmark has 1100 midwives, all registered and under control of the Health Department. This is in a country of three and one-half million people, with a birth rate annually of 75,000. Her maternal death rate is 10 to the 10,000 births, from sepsis, and 17.5 mortality from all puerperal causes, while we have nearly 70 in the aggregate, with a maximum of 160 and a minimum of 30.

According to the Census Bureau we have an estimated population of 110,000,000 with an annual birth rate of 2,500,000.

It is to be borne in mind that our crude and adjusted rates in the United States include the colored race which still shows a total mortality of 111, a puerperal sepsis of 38 and death from other puerperal causes of 73, or nearly double that of the white mothers included in the calculations. This represents a condition, not a theory, as Grover Cleveland said, speaking on another subject, but it must be reckoned with.

Among the cities of 100,000 in the birth registration area, the highest rate from all puerperal causes, 1920 to 1923, appear from Norfolk 130, from Kansas City, Kansas 114; Cincinnati 109 and Omaha 108, as against the lowest, Fall River 30, Oakland 36, and New Bedford 49 per 10,000 births.

The census report shows a mortality from 1923 in which the extremes were even more marked. For instance the relative rank for adjusted rate for puerperal sepsis among the cities shows Spokane highest with a mortality of 168, while deaths from puerperal sepsis show Oakland the lowest with 25. Birmingham had the highest rate from all other causes, 184, while Spokane had the lowest, 28. Throughout the United States the rates for both white and colored mothers both for puerperal sepsis and all puerperal causes are lower in rural than in urban communities.

Dr. J. E. Davis has stated that if every state had good birth and death registration since 1920, it would be shown that puerperal causes of death are decreasing as a menace to the women of the United States. The birth registration area was not established until 1915, and then included but ten states. It now includes thirty-eight states with approximately 90 per cent of the population of the country, but the lax registration of births adds greatly to the high maternal rates because of their inaccuracy.

So there is a gleam of hope that our mortality statistics based on facts will be measurably reduced if we keep up the propaganda on three points: first, education in asepsis and obstetric technique; second, in urging our patients to apply for prenatal care, early in their pregnancy, both in the charity cases and in private practice; and third, an honest, prompt and automatic reporting of all births to the Census Bureau.



Therefore, it not only had the advantage of maintaining menstrual function, but preserved ovarian secretion; and also in doing it with this technic if care is used one is able to maintain the circulation of the ovary.

DR. CHARLES L. BONIFIELD, CINCINNATI, OHIO.—I agree with Dr. Polak that the ovary thrives better if the uterus be left with it; its circulation is *much* better. To me, however, it does not seem absolutely necessary, in operating for inflammatory conditions, to remove all the inflamed tissue. If you remove the infection from a fallopian tube the inflammation around it subsides. Formerly in removing infected tubes I often left a little stump of the tube. I learned that that stump was often infected and kept infecting and reinfecting the endometrium. One could curette the uterus but he could not curette these stumps and they often caused a disagreeable leucorrhea for a number of years. I now, therefore, dissect the tube out of the horn, closing the wound as I sew up the broad ligament and covering it with a fold of the round ligament. My results with this operation have been quite satisfactory and, therefore, I see no reason for cutting clear across the fundus of the uterus.

DR. THOMAS B. NOBLE, Indianapolis, Ind., read a paper on **The Operative Treatment of Abdominal and Pelvic Tuberculosis**. (For original article see the current volume of the Transactions of the Association.)

Tuesday, September 21, 1926

*Morning Session*

DR. LAWRENCE M. RANDALL, Rochester, Minn., read (by invitation) a paper on **Lipiodol Radiograms in the Diagnosis of Sterility**. (For original article see page 457.)

DISCUSSION

DR. OTTO H. SCHWARZ, St. Louis, Mo.—Dr. Newell, of St. Louis, has pictures that are practically identical with those of Dr. Randall's. They are published in the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY (vol. xii, p. 189).

DR. WM. A. COVENTRY, DULUTH, MINN.—How long after the lipiodol injection was the patient operated upon? You have only operated upon one patient within a few days of your injection. I should like to know whether any evidence of irritation or residue of lipiodol material was found?

DR. JOHN N. BELL, DETROIT, MICH.—Dr. Randall, in his remarks, stated that they observed no irritation of the peritoneum where the lipiodin had escaped into the peritoneal cavity. That is very interesting and significant because of the possibility of our treating tuberculous peritonitis in this manner. If it does not irritate the peritoneal cavity, why not give it a trial? So often tuberculous peritonitis apparently begins around the tubes, and it would be a very simple matter to use it as a therapeutic measure in tubercular peritonitis.

DR. JAMES E. DAVIS, DETROIT, MICH.—It must be recognized by all that a method which will contribute so materially to the understanding of the gross pathology of tissues before they are removed from the body is exceedingly valuable. When such pictures can be obtained, the pathology is so easily read, that we must recognize that this diagnostic method is a distinct advance.

The majority of the cases distinctly belonged in the group of malformations sug-





cervix following removal of the cannula. Consequently, there is a very small amount of lipiodol remaining in the pelvis and the element of irritation seems minimal.

Referring to Dr. West's statement, we do not urge operation of these patients. A sterile woman is usually ready to take any chance, reasonable or unreasonable, to overcome her complaint and if a reasonable chance does exist we should do our utmost to make as accurate preoperative diagnosis as possible. We discourage a great many women from operative treatment for sterility, in fact we are inclined to be very conservative in this regard. Following salpingostomy or any plastic surgery on the tubes, no doubt closure from adhesions does occur. Frequently, the tubes will remain patent long enough for pregnancy to supervene.

My impression is that the incidence of male potency or sterility is higher than 10 per cent. If I remember correctly, our figures run between 20 and 25 per cent.

Dr. Davis has mentioned congenital malformations in the internal genitalia in women and I believe that lipiodol will afford us a great deal of information concerning a condition about which we know little.

**DRS. O. H. SCHWARZ AND W. J. DIECKMANN, St. Louis, Mo., presented a paper on Puerperal Infection Due to Anaerobic Streptococci.** (For original article see page 467.)

**DR. PALMER FINDLEY, Omaha, Neb., read a paper on Biologic Defense in Puerperal Infection.** (For original article see page 514.)

#### DISCUSSION

**DR. W. J. DIECKMANN, St. Louis, Mo. (Guest).**—With regard to puerperal infection, I think our results demonstrate that in a clean obstetric service, infections due to hemolytic streptococci are rare. Furthermore, we are reporting the infections which occurred in 2000 deliveries and you will note that comparatively few cases were due to aerobic organisms; these patients in great part were delivered at home with questionable methods. The great preponderance of anaerobic streptococci found by us, although routine cultures were always made for aerobic organisms, gives support to the autoinfection theory. Despite the fact that anaerobic streptococci have been recovered repeatedly from the vagina of both pregnant and nonpregnant women, and granting that autoinfections do occur, we believe that a number of these infections could have been prevented. For example, we found that long, dry labors with the head not engaged were particularly subject to infection by these organisms irrespective of the type of examination, i.e., rectal or vaginal. Personally, I believe that some type of vaginal sterilization, for example, the injection of from 5 to 10 c.c. of a 5 or 10 per cent mereurochrome before vaginal or rectal examination would prevent a considerable number of infections. A well contracted uterus during the early puerperium would offer a less favorable environment.

One ought not wait until a patient is moribund before getting cultures and instituting treatment. Although you deliver your patients with all the aseptic principles known, regard and treat those with a temperature as cases of puerperal infection instead of suspecting pyelitis, malaria, mastitis, etc., and finally, when your patient is moribund, by exclusion conclude that she has a puerperal infection. We have found that the prophylaxis of pelvic thrombophlebitis with its mortality of 80 per cent or higher, by uterine culture and douche, thus insuring proper uterine drainage, is less difficult and more certain than the cure.

As to the treatment of pelvic thrombophlebitis, we feel at present that ligation should be considered. The otolaryngologist ligates the external jugular in mastoid infections with very good success; but it must be done early. Of course, if you ligate

the veins of all patients with a pelvic thrombophlebitis, a considerable number will be ligated in whom it was unnecessary. If you have cultures, however, and ligate those patients with the phlebitis due to anaerobic streptococci with marked proteolytic powers, you will save a number of patients who will die without the operation.

The blood cultures must be taken during or immediately after a chill, or at the height of the temperature. In a case of endocarditis due to the *Streptococcus viridans*, positive cultures can be obtained almost any time; but in cases of pelvic thrombophlebitis the cultures are usually positive only at the time mentioned above.

DR. PERCY W. TOOMBS, MEMPHIS, TENN.—I have been able to demonstrate the presence of the so-called *Streptococcus putridus* in one case only. The clinical picture and the physical findings were as those described by Dr. Schwarz, but the treatment instituted differs somewhat from that described. A bacteriophage was made and 2 c.c. injected on alternate days. I have not yet been able to determine just what effect the bacteriophage has upon the patient, but I do know there is a marked recession in temperature, the blood is improved and the patient has a sense of well-being following its administration. We further treated this patient with transfusion of blood,—600 c.c. on alternate days. Toward the end of her illness she developed acute endocarditis which has since cleared up.

I would like to emphasize the early recognition and prompt treatment in those cases which we have heretofore passed by as simple sapremias. A thorough examination, uterine and blood culture will probably reveal that we are dealing with just such cases as Dr. Schwarz has described.

As Dr. Schwarz reports but four cases I would rather defer an expression as to the advisability of ligation of the pelvic veins until he can give us some definite symptoms upon which we may base our conclusions that operative measures are indicated.

I do not use the curette nor do I believe intrauterine irrigations are indicated in these cases.

DR. GEO. F. PENDLETON, KANSAS CITY, MO.—As to sepsis in general one needs a bacteria, a channel, and a fertile field for bacterial growth. This field is generally in the pelvic veins, occasionally in the uterine wall and adnexa and but seldom in the peritoneum. As Doctor Findley has shown, a cure depends upon the body resistance and reaction around the focus of infection. Surgically we all worry about peritonitis. Obstetrically peritonitis is not the rule. Thrombophlebitis is the common septic process. Doctor Schwarz' slides showing the infected thrombi in the veins illustrated the futility of using the so-called bactericidal solutions intravenously with the purpose of reaching infective foci in veins completely closed. Mentioning mereurochrome brings up the same old argument. I think we get results occasionally from mereurochrome injections. I doubt its bactericidal action when diluted in blood. I consider its action somewhat the same as our modern conception of arsenic in treating syphilis which is not spirocheticidal in the blood solution but acts fundamentally upon each individual body cell, stirring up its production of immunizing bodies and thereby increasing the general body reaction against that infection; in other words, increasing the mass action of body resistance which Doctor Findley has just mentioned. Blood transfusions do the same thing, building up quickly and maintaining body resistance. To get at a late thrombophlebitis we have no other definite method except building up and maintaining body resistance. Personally I rarely worry over patients with putrid discharges. A finger curettement will not damage nature's wall of defense, the type for real worry is the one without putrid lochia, with frequent irregular chills, carrying a moderate temperature, and a pulse from 110 to 120, exceedingly alert and from appearance in very good condition. In general, treating sepsis expectantly will bring favorable results. Most of them get well; some die, however. I would hesitate to get so radical as to ligate the

pelvic veins of all patients on the fifth to the seventh day on account of the much greater mortality compared with the expectant treatment. Those cases which go on and die, however, we naturally wish that we had ligated their veins. Herein lies the value of Doctor Schwarz' and Doctor Dieckmann's contribution. It offers us a new point in diagnosis which will give us a clue as to which cases we should always ligate. In my opinion these cases will be very small in number.

DR. SYLVESTER J. GOODMAN, COLUMBUS, OHIO.—I do not believe the curette has had any place in the treatment of puerperal sepsis for a good many years.

I remember many, many years ago at the American Medical Association when John B. Deaver was advocating operation upon every case of appendicitis, Dr. Keene arose and said that if Dr. Deaver said he had appendicitis he would submit to an early operation, but if a body as important as the American Medical Association were to say to the profession in general that they advocated a very early operation in every case of appendicitis a calamity would happen. Now if a man of the ability and reputation of Dr. Schwarz, should send forth the dictum from this Association that in the early stages of suspected puerperal sepsis, in cases of early putrid discharge, it was advisable to curette either with the finger or a dull curette, then every pseudosurgeon and general practitioner would resort to this method of treatment, with most unfavorable results.

DR. JOHN O. POLAK, BROOKLYN, N. Y.—I wish Dr. Schwarz would clear up in our minds one point in regard to the foul discharge in these cases. Perhaps my conception is wrong but I had always supposed that the foul discharge was the result of tissue necrosis, which was the result of nature's defense below the necrotic area in blocking off the circulation. Consequently I was very much surprised, if I understood the doctor correctly, when he spoke of the curette, for I felt that he was harrowing up a field. I do not believe it would be possible, as Dr. Goodman says, for even such a suggestion to go out from this Society without some adverse discussion.

By following out Dr. Ill's principles for handling these cases I feel that I have fortified my patients against extension from the uterus. I wish Dr. Schwarz would put before us the definite clinical picture of those cases of thrombophlebitis in which, in his judgment ligation is going to offer the best result. I am frank to say that I am not a believer in ligation from my experience, which has not been satisfactory. Our mortality is just 75 per cent in the cases treated by ligation.

The cases treated on the general principle of trying to establish an individual defense by drainage, posture, blood transfusion, etc., have given us a very much better percentage. But I am convinced that there is a time when if the veins were tied and the uterus removed, it would be possible to save some of these cases.

DR. H. M. RUBEL, LOUISVILLE, KY.—I should like to ask what positive percentage of blood cultures were found routinely. Negative reports are too prevalent in obviously infected cases. Should we have our bacteriologist wait for the chill, or catch it afterward, when we have showers of bacteria invading the blood stream?

DR. EDWARD SPEIDEL, LOUISVILLE, KY.—This paper clears up to some extent the reason we have had so many negative reports from laboratories regarding cultures from frankly infected cases. No doubt anaerobic cultures were not made.

It is surprising to me to learn that investigation of the placental site shows such a lack of thrombosis of the veins in that area early after labor, because it has been my teaching that one method of nature's protection against hemorrhage is a thrombosis at the placental site and that the blood at the time of labor clots more readily than under other circumstances.

Another surprising feature in reference to treatment is that such massive blood transfusions were used. I should imagine that in such circumstances there would be

an anaphylaxis or a severe reaction from 700 c.c. of blood introduced repeatedly, especially as the same donor could hardly be used again, and if different donors were used that would be a disturbing factor.

I am inclined to agree only partly with the more aggressive measures that were advocated in puerperal infection. I expect to reintroduce in our hospital this year the method brought out a number of years ago by Dr. Ill, which I will try to state and if I am not correct I hope he will improve upon my statement. I think it is a very wise plan forty-eight hours after a well-developed puerperal temperature to enter the uterus in the proper way for the purpose of getting lochial discharge from the upper part of the uterus for bacteriologic examination. We do it with a curved glass tube and a rubber bulb at the end. That material can then be sent to the laboratory for an examination and culture. At that time an intrauterine douche of 25 per cent alcohol may be given, the uterus loosely packed with gauze soaked with 25 per cent alcohol, with a catheter in the center of it carried to the fundus. Two ounces of 25 per cent alcohol are introduced through this catheter every two hours for forty-eight hours. After the forty-eight hours the gauze and the catheter are removed. In this manner any detritus that has been left in the uterus, and a great deal of infective material, will be carried out; there will not be the danger of having disturbed the protective mechanism of the uterus by any severe measures, such as curettage, which I know Dr. Schwarz did not mean. By curettage he meant, I am sure, simple removal of material by the finger. But I think even so a disturbance may be created and the defensive mechanism broken down, whereas by this method I think no harm can be done and I should judge a great deal of deleterious material might be removed.

DR. H. W. YATES, DETROIT, MICH.—As far as the discharges being fetid is concerned, we have not so much anxiety about those as about the cases that run moderately high temperatures with chills and no fetid discharge; those cases in which, as Dr. Schwarz has brought out, there cannot be secured in some instances a positive blood culture. And, by the way, we find that the blood cultures are more likely to be secured in those instances where the temperature runs low in the morning and then in the afternoon rises to 103° or 104°; and if chills are a feature, the culture should be taken during them.

I should very much hesitate to do packing in a uterus which was definitely septic. It would seem to me that the least possible damage that could be done should obtain. I was greatly surprised, as was Dr. Polak, when the use of the curette was suggested. Certainly in many of these instances there is some small portion of decidua or placenta remaining, and if the cervix is easily dilatable by the finger, it is safe to use the finger in this way because it is a very difficult thing to determine in the early cases of pregnancy whether all of the material has been expelled. In this way I think it is perhaps applicable. On the other hand, it has been our experience in an enormous number of abortion cases to find that if they are let alone, if not instrumented, and no palpation done at all, there is this protective zone built up which has been referred to by several speakers. The temperature and the reactions keep up for a considerable length of time and finally begin to recede and after five or six days the temperature declines. Four or five days succeeding its return to normal it is safe to remove whatever is there, or peradventure the uterus has not already thrown it off which in many instances it does.

DR. JAMES E. DAVIS, DETROIT, MICH.—In attempting a solution of some of the problems we may divide the consideration of the subject into two parts. One is distinctly economic and belongs more entirely to the hospital. It is utterly impossible in the average hospital to have such work done as we have had presented to us here today; to have a special worker like Dr. Diekmann assigned to a problem like this is a very great help. The average laboratory is so organized and the allotment

of money is so restricted that only a sufficient number of workers are available to do the routine daily work.

The clinician represents the other side of the problem. The clinician in his hysteria, when he is bearing the burden of some of these puerperal cases, comes to the laboratory with all his war paint on and accuses every one in the laboratory of inefficiency. He has not ordered the blood culture perhaps until after the period has passed when it is possible to obtain a positive culture. You will notice in the charts that Dr. Schwarz presented that he obtained his cultures at the time of the chill. That is the ideal time to obtain the cultures and it is utterly useless in the majority of cases to take cultures at promiscuous periods.

There are some real problems in the growing of organisms. The efficiency of the bacteriologist must be unquestioned in research work of this type. It is no easy task to recognize the morphologic changes in bacteria. The mutation changes that come in relation to the symbiotic forms that are found requires the ability of an expert bacteriologist for their recognition but I suppose every clinician expects his laboratorian to return to him an expert opinion. He has no right to expect that of the average laboratorian.

The culture media, for instance, is important for the laboratorian to know in order to have these organisms grow in a proper way for their recognition. There is often a very narrow margin between pathologic and nonpathologic forms that the average inexperienced worker is totally unable to recognize.

In regard to tissue changes one can generalize to a very particular degree. All of the reaction is essentially an inflammatory one, that has begun in the circulatory system and its manifestations are more or less closely related to that system.

In regard to the lymphocytes, they have been spoken of as having some specific relation. If there is an infection that begins and remains or manifests itself chiefly in that system, there will be an exhibition of a large number of lymphocytes either in local or general positions. It is a fact that many of the infections of that system are not very well understood as to the significance of their etiology.

There is just one other objection to Dr. Schwarz' part of the symposium: He said the organism was harbored by the patient. That is exceedingly comforting, I am sure. Every clinician will be delighted to hear that and to accept it when he is in a dilemma. Now that may be so some of the times, but the facts are, that in the majority of the severe cases where the patients die the organism has not been harbored by the patient.

DR. SCHWARZ (closing).—I do not want to be misunderstood. In emptying the uterus where infected clots or retained placental tissue is suspected, we use the finger or a blunt curette. The blunt curette in most instances is a vaginal depressor. We do not wish to disturb the spongy decidua. The retained pieces of placenta are usually loosely attached and can be removed with very little disturbance. It is when this retained tissue becomes necrotic there is offered a favorable media for these anaerobic organisms, and as the anaerobic streptococcus is frequently found in the vagina such a condition would favor its propagation.

As we have very few cases of puerperal infection due to pyogenic organisms, we feel that these cases of pure anaerobic streptococci are frequently autoinfections. A temperature over 101° and a lochia with a foul smelling odor on the fourth or fifth day, indicates a uterine culture and a cleansing of the uterus as we have mentioned. The normal lochia at this time has a peculiar fleshy odor but is in no sense foul. Ordinarily there is not sufficient decayed material in the uterus to cause an odor unless the uterus is invaded by these organisms.

As regards ligation, our experience with these organisms is still very limited. Our results have been discouraging with blood transfusion in these infections, and therefore we feel that in the future we shall consider ligation seriously.

In contradiction to what Dr. Davis has said, any laboratory technician can easily isolate these organisms and it is just a question of growing them anaerobically which is very simple, the technique of which has been outlined in this paper.

DR. PALMER FINDLEY, OMAHA, NEB. (closing).—I cannot refrain from expressing my surprise and, to some degree, my concern that the question of the curette should come up in such a society as this. I thought the thing had been buried long ago and I wish that our remarks might be straightened out in the record on the use of the curette because I fear when the general practitioner comes to read our transactions he might interpret our remarks as an endorsement of the use of the curette in the acutely infected uterus. I cannot understand how any one who has any knowledge whatsoever of what is going on in the defense mechanisms of the uterus in taking care of the attacking organism would use it. It is fraught with danger, and my judgment would go back to what I thought was the settled conclusion that the proper management of it is one of masterly inactivity.

That there is a cellular defense mechanism in the pelvic structures there can be no reasonable doubt. To what extent our knowledge of this biologic defense can be applied in the treatment of puerperal infection I am not prepared to say, but it would be well worth while to endeavor to stimulate these phagocytic cells in the effort to combat infection.

## NEW YORK OBSTETRICAL SOCIETY

MEETING OF DECEMBER 14, 1926

THE PRESIDENT, DR. GEORGE H. RYDER, IN THE CHAIR

DR. JAMES A. HARRAR reported a case of **Twin Abdominal Pregnancy with Unusual Features**. (See page 752.)

### DISCUSSION

DR. HARBECK HALSTED found in a study of the cases in recent years at Sloane, five instances of abdominal pregnancy over six months. One woman died and three live babies were delivered.

Dr. Halsted would not deliver the placenta unless it and all its attachments could be removed at the time of operation. One of the babies had been dead nearly a week and even then when the late Dr. Studdiford tried to take out the placenta there was profuse hemorrhage. That was the only casualty. In the other case the baby was dead six weeks before operation. That placenta was fairly easy to separate.

DR. A. C. BECK had difficulty with one of these cases in which the patient almost bled to death, as a result he concluded that possibly the risk would be less if the placenta were left alone. On looking up the literature he found that this was the Italian method of treatment which was followed about 1895, and a dozen cases treated in this manner showed results equally as good as those that followed marsupialization. As a result, he advocated that plan of treatment in the cases which were attached to the broad ligament, the back of the uterus, the intestines and so on; in other words, that were not pedunculated and where the blood supply to the placenta could not be easily controlled. Since that time Dr. Jewett has had a case, which Dr. Beck thinks he reported before this Society, and in which he left the placenta in the abdomen without drainage.

He did not think there was any question that in a case where the fetus has been dead a month or so the placenta should be removed.

Dr. Beck collected about 2,000 cases of abdominal pregnancy with living and dead fetuses after the sixth month and very few of the men had difficulty with the removal of the placenta in cases where the fetus had been dead four to six weeks before the operation. Certainly, if the fetus is dead, he believed it a good plan to wait another month before attempting operation because then the placenta can be removed readily and there is little danger of hemorrhage.

DR. JEWETT said, as the result of his experience, that if the placental attachment in a case of abdominal pregnancy was such that one could control the bleeding, the placenta should be removed. If, on the other hand, there was a broad attachment that could not be removed without dangerous hemorrhage, it would be more advisable to leave the placenta intact. In his particular case an attachment of the placenta was present over the lower and posterior portion of the broad ligament which extended upward over the iliac vessels. Inspection showed that this was a dangerous position and the cord was ligated and the abdomen closed. About a year or so subsequently this patient had an acute appendicitis and Dr. Jewett opened the abdomen. After removing the appendix, he inspected the right lower quadrant of the pelvis, or the right side of the pelvis, where the placenta was located, and found a condition of the tube that simulated a chronic adnexal inflammation. He removed the right adnexa and a microscopic section showed an absence of placental tissue in this mass, conclusively proving that the cavity could take care of the placenta that was left.

DR. H. R. CHARLTON read a paper entitled **Prevention of Carcinoma of the Cervix.** (See page 755.)

#### DISCUSSION

DR. COOK believed that students of cancer pretty generally are agreed now that the type of lesion which predisposes to the development of cancer at a given site is a type of lesion which does not of itself tend to heal. Whenever we have such lesions, regardless of the exciting cause, cancer is a distinct possibility. There are, of course, undoubtedly other facts, because under the same circumstances not every one develops cancer. However, given a type of lesion which does not of itself tend to heal, particularly in an organ which is notoriously common as a site of malignant disease, obviously we are dealing with a very treacherous combination, and that we have in the cervix, the seat of chronic cervicitis. He did not know from simple inspection of the cervix, whether a particular cervix is apt to give rise to cancer or not. Exactly what histologic changes lead to the development of cancer and how long a period must elapse from the time that you see certain changes to the time that you may expect the appearance of cancer, are all unknown. Certainly, it is obviously true from a histologic study of cervixes that are amputated that cancer may develop in a cervix which, grossly at least, looks very much more innocent than another; in other words, the rough, red, eroded cervix, which looks almost cancerous in itself, sometimes is not, as far as one can judge, any more dangerous than the less alarming appearing cervix.

The histologic changes which have been stressed as of special significance are, of course, those in which the epithelium, normally of a secretory type, which lines the endocervical canal and the glands of the cervix, tend to undergo stratification, cornification, and metaplasia. This makes it resemble more nearly the vaginal epithelium, and such cervixes, naturally, are looked upon by the histologist with

more suspicion than cervixes in which there is simply erosion and lymphoid infiltration. Changes in the vaginal cervical mucosa itself do not appear to be of especial significance.

Dr. Cook believed that a painstaking collection of selected, excised, or amputated, cervixes, properly preserved for histologic study, closely checked with a corresponding series in which such prophylactic operations were not done, might give us some help, because what is needed is not only the thorough 100 per cent treatment of chronic cervicitis but some better histologic control, some data which will enable the examining pathologist to advise the clinician that this cervix is really pre-cancerous.

DR. W. P. HEALY said the American Society for the Control of Cancer has been devoting a large amount of effort and money in an effort to educate the public in the question of the early diagnosis and recognition of cancer, apparently because that is about, for the time being, the only practical thing that a society of that kind can accomplish to advantage with the resources at hand. As a matter of fact, that does not control cancer at all. All it attempts to do is to give the individual who may possibly develop cancer a better opportunity to have his or her cancer recognized in time to have his or her life prolonged or possibly saved; but it has nothing whatsoever to do with the control of cancer as a public health problem. He felt, therefore, that that organization is failing in its actual purpose—the control of cancer, because that must come from another source. It must come from a source that the doctor has referred to in his paper, namely, an effort to find out what causes cancer and prevent it in that way.

Dr. Charlton has specifically emphasized cervicitis; in fact, that has been the entire topic in his paper. Cervicitis of the type he refers to, namely, infectious cervicitis, Dr. Healy believed had very little to be credited with from the standpoint of causing cervical cancer. Infectious cervicitis is most common in prostitutes, and prostitutes seldom have cancer of the cervix. As a matter of fact, Dr. Healy's own reaction to the etiology of cancer of the cervix is that it is based very much more upon trauma resulting from injury—tears, destruction of the lymphatic protecting power of the cervix by lacerations from childbirth, or by large destruction of cervical epithelium as we see in erosion of the cervix. For that reason, he believed one of the best ways to prevent the development of cancer of the cervix in the younger woman who develops an erosion is to thoroughly cauterize it under anesthesia. The older woman does not develop erosions, it is a very unusual thing to see an erosion of the cervix in a woman over forty years of age. In those young women one can by use of the Paquelin cautery, not only destroy the erosion, but conserve the cervix for its normal function, improve the blood supply to the tissues to such an extent that they protect themselves from the possibility of the development of cancer. In the older woman, over forty years of age, in whom we know that the child-bearing period is at an end, if there is a diseased cervix, it should be amputated in practically every instance. In reviewing the cases at the Memorial Hospital, the most important factor is not cervicitis from some ordinary infection, but the pregnancy which has damaged the cervix and reduced its resistance and permits something to get into those tissues that later on may result in the development of cancer.

You occasionally see carcinoma develop in the cervix of a very normal young woman who has had no cervicitis, and no pregnancy, so that there are other factors that we have no control over that do bring about the development of carcinoma. Dr. Healy concluded that, taking the factors that present themselves to us as the most common, extensive trauma is the most important one, and not infection.



DR. J. MILTON MABBOTT referring to a paper read before this Society a few months ago on the actual cautery treatment of cervicitis, stated his belief that the resulting cicatrization of the cervix might result in an increasing number of cancer cases, when the susceptible age is reached by these women. He, therefore, favored the Sturmdorf, or similar operation, which results in a more natural lining of the canal.

DR. HARRY DORMAN, BEIRUT, SYRIA, said that in Beirut, there was relatively very little carcinoma of the cervix, and that he saw only five or six cases in the course of a year. On the contrary, they encountered a great deal of cervicitis and erosions. Cervices in all stages of laceration are common, so that he was not impressed with the incidence of lacerations of the cervix or cervicitis as being one of the important factors in the production of carcinoma. It seemed to him that there must be some other cause for it which is prevalent in this country and which in Syria does not prevail to the same extent; and the only practical suggestion he could make as regards the question of prophylaxis of carcinoma is for women to move to Syria.

DR. H. B. MATTHEWS said that as this is the day of prevention, the first way to prevent these diseased conditions in the cervix is to do immediate cervical repair, as advocated and carried out by Dr. Emge, of San Francisco, who had written two papers on this subject in the last four or five years; and by Dr. Bubis, of Cleveland, who reported over 200 cases and followed them for a sufficient length of time (three years) to enable him to distinctly state that primary repair of the cervix is a perfectly good surgical procedure.

Secondly, if you do not believe in the immediate repair of the cervix, then with a nasal type cautery eight to ten weeks postpartum, you can inroll and invert these everted, lacerated cervices so that healing takes place without ectropion, an excessive amount of scar tissue, stricture and stenosis. If you do not see the case until the woman has a deeply infected cystic cervix, then you can do a deep cauterization under anesthesia, if you are careful not to use the round-pencil type of cautery and destroy all the endocervical mucous membrane. One-half of the circle is done at one sitting, and two or three weeks later the other half, leaving islands of mucous membrane covered with epithelium so that the canal can become epithelialized again and stricture or stenosis avoided. The low-grade chronic infection and the lacerations which it seems are thus healed, have something to do with the production of cancer. Further if you do not choose to use the cautery, then an almost perfect surgical procedure is the Sturmdorf operation, done according to the proper technic.

DR. CHARLTON (closing) said that in relation to the duration of irritation prior to evidence of malignancy, he would like to refer to a statement made by Leach, who said that in many of the chimney sweeps in Great Britain the irritation due to the soot and sebaceous mixture goes on for a period of 10, 15 or 20 years before carcinoma develops. Dr. Charlton felt that Dr. Healy limited his nomenclature too sharply. When he (Charlton) spoke of cervicitis he did not in any way limit cervicitis to cases which are primarily due to the gonococcus or such other organisms as various prostitutes may harbor. He had in view the chronic inflammatory conditions in the cervix following lacerations, following injury of one sort or another, as well.

Dr. Healy spoke of malignancy developing in young women who had had no cervical trauma. The columnar collar that extends out of the canal and invades the portio is a hyperplasia which may precede the development of cancer even in these young women, and he was rather inclined to believe that it does. He was absolutely in accord with Dr. Healy's attitude towards cauterization of the cervix.

DR. R. A. HURD read a paper entitled **A Study of 1000 Cases of Uterine Retroversion.** (For original article see page 742.)

### DISCUSSION

DR. HERMAN GRAD said that Dr. Hurd's study afforded him an opportunity of ascertaining the results from his own operations at the Woman's Hospital. In the cases in which his procedure failed he believed this was due to the lack of proper adhesions between the round ligaments and the internal inguinal ring. The uterus has a certain normal level in the pelvis and if this is disturbed no type of operation will be successful, especially if the pelvic floor, the cardinal ligaments or the fascia are defective. In some cases that came to secondary operation Dr. Grad found that the uteri had undergone sufficient hypertrophy so that its weight alone would undo the previous operation.

As for the point made that where the anatomic results of the operative procedure are good and the patient is relieved of her symptoms, this in his belief was due to the fact that before operation the pelvic circulation was disturbed but that with the restoration of the pelvic floor the blood flow was equalized and the symptoms consequently relieved. Dr. Grad called attention to the main features of his procedure in which the broad ligament is split, the two layers separated, the round ligament shortened and sutured to the fibers of the internal inguinal ring. He claimed as a result that nothing abnormal is created in the pelvis, the abdominal wall is not traumatized and the fallopian tubes are not injured.

DR. DOUGAL BISSELL said that he wanted to sound a note of warning regarding the present day tendency of operating for retroversion without due consideration of the possibility of securing relief through other means, for retroversion is a mechanical pathology which can usually be attacked and relieved by nonsurgical means. Yet operations for its correction constitute a goodly proportion of the surgical work done on the gynecologic services of the hospitals throughout the country. The fact that a large number of these cases could be afforded relief without operation does not reflect credit on the mechanical skill of the operators; throws doubt upon their knowledge of the specialty they follow and may even bring into question their moral character from a commercial viewpoint. In fact gynecologists have reached a position with respect to the frequency of retroversion operation almost, if not as faulty, as that reached some time ago by the general surgeon on the frequency of appendectomy, but the general surgeon holds one advantage over the gynecologist in his position, i.e., if the operation be done unnecessarily, the patient, if he survives, is usually no worse off and is always benefited to the extent of being insured against the possibility of appendicitis. But though the patient operated on for the correction of retroversion may secure permanent relief, too often she gets but temporary relief and unless the appendix be removed at the time of operation, she cannot be said to have been at all benefited.

Dr. Bissell deplored the fact that pessaries do not constitute a more important part of the armamentarium of the present day office technic. Some say that they never use them; on the other hand what is equally, if not more distressing, is a case where an ill-fitted pessary inflicts injury by pressure or is too small and serves no purpose. I have several curious morbidity dealing pessaries in my possession inserted by men of big reputation that work their way almost into the pelvic viscera. Patients with retroversions in the hands of these men might well submit to operation.

If the pessary cannot be employed with skill, it is a dangerous instrument,—but why is it Dr. Bissell asked that the art of fitting a pessary is fast becoming

a thing of the past? The responsibility for this failure must rest at the door of the teaching institutions. Colleges teach its use theoretically, hospitals pass it by and postgraduate institutions treat it much the same, but it must be said in all fairness that the hospital regime of the present day is more adapted to operative work than to treatment; that the patients who enter its wards have been recommended by clinical assistants or family physicians and have been told on being sent in that an operation was necessary; they have adjusted themselves to this idea and enter with the expectation of being operated and are bewildered and disappointed if not operated. Had they been properly handled outside, a good percentage of these patients would gladly have accepted the relief a properly fitted pessary would have afforded.

Dr. Bissell did not advise the pessary in all cases of retroversion. If the patient deliberately prefers an operation to a pessary after all facts have been clearly placed before her she is entitled to her preference.

If the pessary cannot be fitted to advantage or cannot be introduced and removed without great distress and there exist definite symptoms of retroversion, operation is justified. If the retroversion is limited in motion and the corpus does not assume its normal position on manipulation, the pessary is contraindicated and an operation should be done. If the corpus is fixed as the result of an old inflammatory process and the patient has definite pelvic symptoms, an operation is justified to relieve this and the opportunity should then be taken to correct the retroversion.

There are other indications which justify operation but these are difficult to classify. There are cases, for instance, where the sigmoid is adherent to the ovary, tube, broad ligament or round ligament, the result of a sigmoiditis in childhood, sufficient to restrict the uterus in its motion but difficult to determine until the abdomen is opened, also congenital deformities, particularly those of the round ligament where this ligament passes downward and backward from the internal ring to the extent of 4 or 5 cm. in the direction of the cecum, and anchored by the intraabdominal fascia so as to change its course abruptly in a median direction. The direction of the pole under these circumstances when effort is made to restore the fundus to its normal position is, of course, backwards and to the right.

Subjective symptoms associated with retroversion of the uterus may in great part be dependent upon some other pathology so that the etiology of all symptoms found should be traced to their source or sources. The patient should be informed then and there of the findings and operated upon only with a clear understanding of a contemplated second operation, if both cannot be done at the same time.

A retroversion technic which does not insure against recurrence after labor, is in Dr. Bissell's opinion, unsatisfactory, and one which does not permit of pregnancy taking place soon after operation does not meet all the requirements of a satisfactory technic. So confident is Dr. Bissell in the results of the operation which was described that he does not hesitate to perform it even when unexpectedly opening the abdomen, he found a five or six weeks' pregnancy complicating the malposition. Three times he had met this complication of retrodisplacement of the uterus and on each occasion, he unhesitatingly shortened the ligaments with satisfactory results; two of these cases went to full term and delivered without recurrence; one had an abortion performed near the fourth month, having been thoroughly disgusted with the results of the operation. The latter patient, of course, felt confident that the operation would relieve her of her embarrassment and failed to give the proper history of her case; examination following abortion showed the uterus to be in proper position.

DR. HARBECK HALSTED wanted to protest against the way in which the Alexander operation had been spoken of. He believed that, in the presence of a movable retroversion without complications, in a multiparous woman, it is the ideal operation, as opening of the abdomen is not entirely without risk, and if we have an operation that will cure, as was shown by this series of cases, 100 per cent of cases without opening the abdomen, he did not think we should relegate that operation to oblivion. We should bear in mind the fact that it should not be done in nulliparous women, but only in cases where we can replace the uterus, where we feel an operation is indicated.

DR. H. D. FURNISS said that there was a type of case that should be left alone, namely, the so-called congenital retroversion. The results of operation usually are not good either from a symptomatic or anatomic standpoint, as it is apt to recur. If done a combination of shortening of the round ligament plus uterosacral shortening is in order.

A complication Dr. Furniss found in the so-called uncomplicated cases is pelvic varicocele, even where there is no adnexal disease, particularly in the thin woman of the so-called asthenic type. It is relieved to a great extent by putting the uterus in proper position.

DR. F. C. HOLDEN said that about ten years ago he read a paper before the A. M. A. on potent factors in the failure of operations for retroversion. He tried at that time to analyze the different types of retroversion and specify why in certain cases operation was followed by failure. Since then he had learned a great deal about retroversion. He assumed that the subject was a discussion of different types of operation. One thousand cases were presented with very excellent statistics. The Webster-Baldy operation is the one which has fallen down the most. This operation was condemned some time ago by Dr. J. O. Polak in which the results following that operation were based on a series of cases to which he referred, but at that time he was not doing this operation according to the Webster-Baldy technic. That applies to many of these operations. A man is doing a certain operation, but it frequently is found that he is not doing it according to the proper technic laid down for the particular procedure.

Dr. Holden believed there were many operations satisfactory only if they were well executed, and that there should be some individuality about the selection of operations, or a combination of operations. In his hands the Webster-Baldy procedure gave good results, especially with a prolapsed uterus. He did it after a certain technic and had no record of any private cases where it has failed. Many of the operations that are failures postpartum are not failures because of the operation, but because the patient does not receive proper prenatal care and proper care after subsequent pregnancy. In the hands of the ordinary operator you probably get as large a percentage of results with a simple operation like the Olshausen as with Bissell's operation, which is an ideal operation, but difficult.

Dr. Holden believed that Dr. Hurd should classify retroversions as acquired and congenital and thinks it makes quite a difference how we treat them.

DR. GEORGE W. KOSMAK wanted to confirm what Dr. Bissell said about the conservative treatment of retroversion of the uterus, particularly in the young woman. If we follow our cases three or four months after delivery, a great many retroverted uteri are found which are not detected when the patient is discharged from the hospital. Very often the uterus is anteverted in position for four to six weeks and assumes the retroverted position after the woman is up and about considerably, and at three months retroversions are detected that are not present at the time of discharge. For that reason Dr. Kosmak believes all women

who have borne children should be examined at least three months after labor. We find a great many young women have movable retroversions which are noted after the first delivery which may perhaps give them symptoms which can be relieved readily enough by the means Dr. Bissell referred to, namely, the proper use of a properly fitted pessary, calisthenic exercises and a number of other things that will undoubtedly suggest themselves. In most of these young women it is better to postpone operation until they have gone through as many pregnancies as they desire. In women who have done this and in whom the retroversions persist and are not relieved by pessaries and other measures employed for this purpose, operative procedures can be indulged in.

Dr. Kosmak wanted to second what Dr. Holden said about the efficacy of the Baldy-Webster operation in these cases. The uteri are usually heavy and the ovaries usually prolapsed.

Should these women become pregnant again the results are almost always good, and in his own experience he had not had a single failure of a Baldy-Webster operation, except in one instance just about a year ago. In this woman, who had previously had two children with very difficult labors and extensive lacerations and a large congested uterus which was causing a great deal of pain and trouble, he did a Baldy-Webster operation after the second pregnancy. After her third pregnancy a recurrence took place which was due to the very difficult labor and bearing-down efforts rather than to the failure of the operation itself. Therefore he wanted to say a good word for the Baldy-Webster operation, although the statistics at the Woman's Hospital do not seem to bear a favorable attitude toward this procedure.

DR. HURD said, in closing, that in justice to Dr. Grad, all these cases were in the public wards and were done by a group of men. The cases he had personally reported, were attended by a slightly better percentage; that is, there were fewer recurrences in those cases than in the ones done by the group. Dr. Hurd believed that this might also hold good for the Baldy-Webster operation, as Dr. Holden suggested, for, perhaps they were not as familiar with the technique of the Baldy-Webster operation at the Woman's Hospital.

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## BROOKLYN GYNECOLOGICAL SOCIETY

*STATED MEETING, DECEMBER 3, 1926.*

DR. DONALD MACOMBER, Boston, Mass., (by invitation) read a paper on **The Emotional Life of the Woman in Relation to the Practice of Gynecology.** (See page 732.)

### DISCUSSION

DR. W. H. CARY, referring to the importance of the subject, stated that the Fellows who were associated with him at the hospital had often heard him refer to this interesting group of patients whose symptomatology was due to certain emotional experiences which simulate the symptoms of a pathologic disorder. He believes these conditions are becoming and are going to become still more common in this day of freer relationship between the sexes and the artificial stimulation from alcohol. It really makes very little difference whether one is dealing with a woman of the intense home-loving, repressed type, such as Louis Bromfield discusses in his "Early Autumn" and "Green Bay Tree," or whether one is dealing with the type of women, such as Chambers describes in his books of New York.

society, or the type that Galsworthy gives us, the flighty, high tensioned girl. The sum and substance of this problem is this: the abnormal aspect of repression and sexual overstimulation is passive pelvic congestion. There are certain symptoms which can be considered almost pathognomonic, such as the oversecreting cervix to which Dr. Macomber referred, the enlarged tender ovary, which is not inflamed in the sense that it is involved in the adhesions of an associated salpingitis, and bladder irritability. When you find these symptoms in a patient without any pathology to explain it, have the courage of your convictions and say, "Here is a case of emotional origin." Aside from depletion with tampons the question of exercise is important, and in this connection Dr. Cary considered horseback riding of great value. He feels that in the intense, quiet, subdued sort of patient it is well to encourage her to get out socially and to meet people in order to obtain the advantage of social contacts and emotional outlets. When one considers that, of the college women who answered the questionnaire sent out by the Society of Social Hygiene in New York, 12 per cent admitted sexual intercourse and 60 per cent some form of abnormal sexual stimulation, it is evident that a big percentage of patients are bound to show symptomatology which has some origin in the emotional side.

DR. GORDON GIBSON claimed that before we can appreciate emotional disturbances we first must understand what the emotions are and determine their origin, and then apply these developed feelings to things which happen in the life of a woman. Very few psychologists have the same conception of the origin of emotions. However, they all have a fundamental beginning, and that is the first concept. What is the first concept that a baby has? It is a concept of self. The first thing a baby takes an interest in is its fingers and then its toes, and it is very happy in playing with its fingers and its toes, as long as it is not disturbed. If something disturbs it and distracts it from that happiness, the disturbance leaves an impression on the baby. The happy baby is one that does not have its self-concept disturbed, and as that baby grows and the individual develops, its concept of self is influenced by its environment, by its training, and by the attitude of those with whom it comes in contact. Ultimately that individual develops an ideal and a hope, and with that ideal and that hope are certain so-called higher feelings. A higher feeling is a painful one if it conflicts with that hope and ideal, and it is a joyous one if it concurs with the individual's hopes and ideals. Every girl as she is trained and grows up has a certain sex ideal. If her experiences agree with her hopes and her ideals, her emotion is one of joy; if they do not, it is one of grief or pain. The emotion gradually becomes greater and greater until it dominates her consciousness. This becomes so strong that it becomes a conscious emotion which dominates her reactions. The emotional disturbances are present because of the failure of the woman to arrive at her hopes and her ideals. As an effect of that there is developed a low emotional threshold, as the neurologists like to speak of it, and that causes all sorts of emotional disturbances proclaimed as symptoms.

DR. HARVEY B. MATTHEWS considered that this problem is a dual one; and that both the man and the woman must be studied. The gynecologist must quite often call in the urologist or psychiatrist for diagnostic aid. The three must work together.

Another very important point is the matter of chronic passive congestion. He agreed that this leads to certain pelvic lesions, notably leucorrhea and multicystic ovaries. Chronic passive congestion must be at least alleviated, if not eliminated in the cure of sterility, or in the improvement of fertility. A cervix need not necessarily be the seat of a chronic infection because it has a discharge coming from it.

A third point which might be referred to is the aggravation of chronic endocervicitis by long continued passive congestion in the pelvis, with an increase in the leucorrhea.

DR. CAMERON DUNCAN wanted to know what effect Dr. Macomber had obtained with psychoanalysis in these cases in the female. The genitourinary men can often clear up some of these infections in men by treatment along urologic lines, and the psychologist by getting some complex straightened out.

Another thing that seemed to Dr. Duncan worthy of a little attention was the question whether abnormal emotions in the female were not due to a lack of normal emotions as a result of overcrowding or overstraining during the adolescent period.

DR. A. KOPLOWITZ said that for quite a number of years he had been accustomed to instruct the husband in his duties to his wife. The various ways of satisfying her sexually and allowing her to have an orgasm will almost revolutionize her entire sexual life and eliminate pelvic congestion.

DR. MACOMBER (closing) said that for depletion he used boroglycerin suppositories, or some with ichthyol or protargol. The other standard methods of depletion are cold sitz baths, and hot douches. One should find the cause of the congestion and treat it emotionally as well as physically. Dr. Gibson spoke about the states which precede emotional disturbances, and he fully agreed with him, but wanted to limit his presentation to the patient as she comes into your office, with certain gynecologic symptoms. Of course, one does not know when one listens to their story whether he is dealing with a case of gonorrhea, if the patient has a leucorrhea for instance, or with an emotional disturbance. When one finds that there is an emotional disturbance in the case, then the investigation must go back far enough to find what cause of the dissatisfaction lies at the background of the emotional disturbance. As for psychoanalysis, although Dr. Macomber had sent some patients to the psychologist, he believed that usually one can best do his own psychoanalyzing. It is a matter of searching into the background, into the subconscious life of the patient, to forgotten experiences. This was illustrated by the patient to whom he referred, who had been raped twice in girlhood. That terrible emotional experience persisted into married life and led to ten years of sterility before it was finally corrected.

A number of patients who complained of pruritus, had an oversecretion. He had had patients who took daily douches to avoid that but the pruritus persisted until the emotional background was cleared up.

As for the "dual" problem, he felt that one is very much more likely to succeed by a one man approach. Impotence may be due to the man, or to the woman. It is usually a mutual problem and if one turns that over to the urologist, or to the psychologist, or to some one else, he will never get anywhere. To cure those patients one must work the thing out for himself, because it is the prestige, so to speak, that one gets from thoroughly understanding all the ins and outs of that particular problem, that enables him to accomplish a cure. In several of the cases quoted vaginismus and impotence had been present for as much as ten years.

# Department of Reviews and Abstracts

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CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

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## Collective Review

### THE OBSTETRIC LITERATURE OF 1926

By J. P. GREENHILL, B.S., M.D., F.A.C.S., CHICAGO, ILLINOIS

*(Attending Obstetrician, Chicago Lying-In Hospital and Dispensary; Attending Gynecologist, Cook County Hospital; Associate in Obstetrics, Northwestern University Medical School)*

*(Concluded from May issue.)*

#### PUERPERIUM

Liubimowa<sup>145</sup> who studied the effect of coitus on labor and the puerperium, found that premature rupture of the membranes and morbidity during the puerperium occurred twice as often among the patients who had intercourse during the last months of pregnancy as among those who did not. The reviewer has knowledge of a few cases of severe puerperal sepsis, two of which were fatal, where the infection most likely was due to coitus just before the onset of labor. In these cases, the membranes ruptured during coitus and the patients had spontaneous deliveries.

Küstner<sup>146</sup> treated ten patients who had puerperal fever by giving huge doses of alcohol and obtained good results. E. Novak<sup>147</sup> questioned 25 surgeons, gynecologists and obstetricians concerning the value of anti-streptococcus serum and found that 16 considered it of no value. Not one evinced any enthusiasm for the serum.

The hemorrhages which occur late in the puerperium are not always associated with retention of placental tissue. Secondary hemorrhages may occur with the onset of symptoms of a severe infection, and a septicemia may follow if intrauterine manipulation is practiced in the attempt to empty the uterus of suspected placental remains. Couvelaire<sup>148</sup> reports three such cases and suggests for this condition the name metrorrhagic form of puerperal infection. Levy-Solal and Ravina<sup>149</sup> report five additional cases. For severe cases, hysterectomy is advised.

#### THE NEWBORN

*Physiology.*—From researches on the amnion and vernix caseosa Keiffer<sup>150</sup> concludes that the vernix is the result of the secretion of cholesterides and glycerides by the amniotic epithelium. Vernix is not a waste product but an embryotrophic substance and should be allowed to remain on the skin to be absorbed.



*Complications.*—Reed<sup>151</sup> makes another plea for measuring babies during pregnancy in order to avoid postmaturity. By using the McDonald, the Perret and the Ahlfeld methods, he has been able to measure babies with great accuracy. If the maturity of the child is beyond question, the pregnancy should be terminated. Nicholson,<sup>152</sup> however, believes that true prolongation of pregnancy is rare and that there is no fixed gestation period. He agrees with Barbour that the head is the best pelvimeter and we should attempt to judge the degree of adaptation between the fetal head and the maternal pelvis.

Among 6,035 labors, Zangemeister<sup>153</sup> found anomalies in the first stage of labor in 2 per cent and the result was that 23 per cent of the children died and 30 per cent were born asphyxiated. The most unfavorable cases were those in which the heart tones slowed down to or below 100. In 94 per cent of all the cases, there was premature rupture of the membranes and among these, 65 per cent of the babies were born dead or asphyxiated. To determine the cause of intrauterine fetal asphyxia Louros and Müller<sup>154</sup> advise the use of chloroform. If the latter relieves the abnormality in the fetal heart tones, the cause of the asphyxia is excessive uterine contractions and no further treatment is necessary. If chloroform fails, there is a disturbance in the fetal circulation and labor should be terminated without delay. In asphyxia of the newborn, where the heart is beating and there are no or only faint respiratory efforts, the reviewer strongly recommends intramuscular injections of alphalobelin for it has proved very helpful.

Belding<sup>155</sup> discusses the etiology and epidemiology of impetigo contagiosa neonatorum and like other investigators, found the cause to be a strain of *Staphylococcus aureus*. Krigbaum,<sup>156</sup> however, believes that a possible cause for pemphigus neonatorum is commercial liquor cresolis compositus (lysol). At the Chicago Lying-in Hospital where more than 3,000 babies are delivered each year, commercial lysol is used and there has not been an epidemic of pemphigus for ten years. Even sporadic cases are unusual. The cause of pemphigus is a strain of *Staphylococcus aureus* which is transmitted by individuals and supplies; hence asepsis and cleanliness are of the utmost importance. Strict isolation of infected babies is imperative.

Among 5,457 confinements at the New York Lying-in Hospital, Rosensohn<sup>157</sup> found 227 stillbirths (4.1 per cent); but the striking fact is that 41 per cent of the stillbirths were macerated. Syphilis accounted for only 15 of the 94 macerated fetuses and toxemia was associated with 13; but in 44 cases no cause could be found. Rosensohn's paper supports the contention that syphilis is not as great a cause of fetal death as was formerly believed and that toxemia is of almost equal importance. This is certainly true for the white population of this country, although among the negroes, syphilis plays a very important rôle. It must also be remembered that even in patients with syphilis or with positive Wassermann reactions, not all the fetal deaths are due to syphilis.

Case and Cooper<sup>158</sup> report five cases of anencephalus diagnosed before birth and verified by roentgen-ray examination. Anencephaly represents only a small portion of fetal monstrosities and the latter are not infrequently associated with placenta previa as pointed out by Greenhill.<sup>159</sup> According to Stein and Arens<sup>160</sup> the roentgenographic diagnosis of intrauterine fetal death cannot usually be made independent of other clinical data because overlapping of cranial bones and asymmetry of the

head have been observed in the live fetus to the same degree as in the dead. Ries<sup>161</sup> discusses the danger of malformation of the fetus in roentgen-ray treatment during pregnancy and reports an interesting case where many abnormalities were found at autopsy. Werner<sup>162</sup> in an elaborate paper on "Roentgen children" points out that after radiation there is not only an increase in abortions but also a tendency to abnormal children. In experimental work on radiated animals, anomalies appear in the second generation; hence in human beings we may have to wait many more years before we really know how much damage x-ray treatment can produce.

Bland,<sup>163</sup> and also Newman and Levy<sup>164</sup> write on the injuries of the infant during delivery. The latter authors express an unwarranted reserve concerning the use of forceps. They feel that there are very few times when forceps should be applied and maintain especially that forceps should never be used on the aftercoming head. With this opinion the reviewer takes strong exception as he does also with the statement that no attempt should be made to deliver an arm anteriorly in breech extractions. In some cases it is easier to deliver the anterior than the posterior arm. Baker<sup>165</sup> believes that the two main causes of intracranial hemorrhage are intense venous congestion caused by acute anaerobiosis and stress of delivery. In the author's series, hemorrhage occurred more frequently in fullterm and postmature than in premature fetuses. This is in marked contrast to the experience of many others. Sharpe and MacLair<sup>166</sup> found bloody and blood-tinged cerebrospinal fluid in 9 per cent of 500 newborn babes. Firstborn full-term males having difficult or prolonged labor, where forceps are used as a last resort rather than early, are more liable to this complication. Others in this group were delivered by midforceps or breech extraction. Dicks<sup>167</sup> believes that trauma and not hemorrhagic diseases is the most important factor in intracranial hemorrhage and he agrees with Sharpe and MacLair that lumbar puncture is most valuable. Wilcox and Caffey<sup>168</sup> report 2 cases where lead nipple shields used for a long time by nursing mothers were the source of lead poisoning in infants.

#### THE PLACENTA

During the last few years milk has been injected into the umbilical vein to determine the intactness of the placenta. Franken<sup>169</sup> advocates the use of air for the same purpose. Vaux and Belk<sup>170</sup> studied the umbilical cord and found that very few cords were alike. McCord<sup>171</sup> found syphilitic placentas in 40.6 per cent of positive Wassermann cases. Siddall and Hartman<sup>172</sup> classify infarcts of the placenta into four groups, all of which consist of degenerated villi and elements from the maternal blood. They found infarcts in 67.7 per cent of 700 placentas. Siddall<sup>173</sup> also found six small angiofibromata of the chorion in 600 placentas. J. W. Williams<sup>174</sup> discusses the placentation of one quadruplet and six triplet pregnancies.

#### MISCELLANEOUS

According to DeLee<sup>175</sup> the five most common errors in obstetric practice are, viz.: (1) failure to make a complete diagnosis, (2) lack of knowledge of, or failure to practice the real principles of asepsis, (3) ignorance of the course of occiput posterior positions, (4) operating

before complete dilatation of the cervix is present, and (5) a disappreciation of the pathologic dignity of the art of obstetrics which leads to downright neglect of the woman in labor. Among 4,488 cases in an outdoor clinic, the obstetric mortality was 0.27 per cent which, according to Bailey,<sup>176</sup> is 50 per cent below the figures for New York State. The stillbirth mortality was 3.5 per cent and the neonatal mortality 1.7 per cent. The summation was over 30 per cent lower than the figures for New York State. These good results are due to the early transfer of the major operative cases to suitable hospitals and to aseptic technique. Rosensohn<sup>177</sup> analyzed the obstetric mortality at the New York Lying-in Hospital for 1924 and found the gross maternal death rate to be 0.4 per cent, the stillbirth rate 4.1 per cent and the infant death rate 2.8 per cent. The maternal mortality for cesarean section was 4.7 per cent, for podalic version 3 per cent and for eclampsia 23 per cent. Coffin, De Kruif, Southard and Hamblen<sup>178</sup> studied the maternal mortality figures of Massachusetts for the years 1922 and 1923. They found that septicemia, toxemia and hemorrhage were responsible for 58 per cent of the deaths, and in 591 of this series of 984 cases, operative procedures had been undertaken. Lack of adequate prenatal care was evident in 89 per cent. H. A. Miller<sup>179</sup> made 1,000 examinations of women as soon as possible after their children were six weeks old and found that postpuerperal morbidity occurs much more frequently than is generally supposed. Operative deliveries and fever during the puerperium increase this morbidity. C. J. Miller<sup>180</sup> discusses the preventive aspects of postpartal care and particularly emphasizes cervical lacerations, retroflexion of the uterus, abdominal support and the follow-up of patients who have had toxemia.

Of 1,000 women under the observation of Danforth and Galloway,<sup>181</sup> 18.8 per cent had retrodisplacement of the uterus during pregnancy or the puerperium. Only 5 out of 55 women who had retrodisplacement during pregnancy, complained of symptoms. Of the women who had retroplaced uteri on the 12th day after labor, 40 per cent were relieved by the knee-chest position.

Lee<sup>182</sup> discusses the teaching and practice of obstetrics basing his opinion on an analysis of cases at the Cook County Hospital where the policy is decidedly conservative. Welz<sup>183</sup> gives a very stimulating report on the prenatal work in Detroit and shows the numerous benefits derived from this work. Such a paper will go a long way in convincing not only physicians but also lay individuals of the great value of prenatal care. Adair<sup>184</sup> outlines the physician's part in a practical state program of prenatal care, and Mosher, Kosmak and Schwartz<sup>185</sup> publish the report of the Joint Committee on Maternal Welfare. The plea of the committee is that less time be devoted to those branches in the medical curriculum which are more or less cultural and that more hours be given to obstetrics which does not now have the attention it should have. The Committee has also issued an outline of "Standards of Prenatal Care"<sup>186</sup> for the use of physicians. Rowland<sup>187</sup> does not believe that the best results in the reduction of mortality and morbidity in childbirth are going to be obtained through the further education of physicians and social service nurses but through efforts to bring certain facts directly to the laity, and he mentions nine particular suggestions for this propaganda.

DeLee<sup>188</sup> describes in detail his ideas concerning the maternity ward

of a general hospital. He emphasizes that a proper modern maternity should have (1) wards and rooms for clean puerperae, (2) nurseries for clean babies, (3) a receiving room near the entrance for the distribution of cases and the separation of infected ones, (4) observation rooms for suspect mothers, (5) observation nurseries with cubicles for suspect babies, (6) a disconnected isolation pavilion, provided with (a) individual suites (room, bath, toilet, lavatory and sterilizer), (b) clean nursery for the babies of infected mothers, and (c) private rooms or large nursery with individual cubicles for infected babies.

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426 EAST 51ST STREET.

## Selected Abstracts

### Miscellaneous

**Schmidt, H. R.**: The Secretion and Absorption of the Liquor Amnii and Its Disturbance in the Presence of Monstrosities. Monatschrift für Geburtshilfe und Gynäkologie, 1926, lxxii, 1.

Anatomic studies have shown that the liquor amnii is a special secretion of the amniotic epithelium and it has been supposed to come chiefly from the epithelium of the placental portion of the amnion. The epithelium of the latter differs from the rest of the amnion for its cells are high and cylindrical and appear to have secretory activity. The amount of fluid which reaches the liquor amnii directly through the maternal blood is very small.

The epithelium in cases of polyhydramnios does not differ much from the epithelium of normal cases. Polyhydramnios may result not only from hypersecretion but also from lessened absorption. A great part of the absorption occurs in the alimentary tract of the fetus after the liquor has been swallowed. In many cases of polyhydramnios there existed an absence of such absorption, e.g., because of atresia of the upper intestinal tract. Such a case of polyhydramnios associated with a tracheo-esophageal fistula is reported by the author. The opening between the two organs was barely large enough to permit water to pass. In this fetus the intestinal tract was entirely empty and was tightly contracted.

J. P. GREENHILL.

**Küstner, H.**: Does the Child Help Itself during Labor? Monatschrift für Geburtshilfe und Gynäkologie, 1925, lxxi, 14.

In ancient times the accepted belief was that when the fetus was mature it initiated and completed labor through its own activity. During the last century there was a reaction and no mention at all was made of the self-help of the fetus during labor. However, while we do not believe that the child braces itself against the uterus and delivers itself, we should not maintain that the child does not help at all. Sellheim is of the opinion that the child does help in its own delivery. This assistance consists in reflex attempts to accommodate itself to the birth canal during deliv-

ery according to the law of least resistance. Movement of the child may occasionally be seen in the interval between pains when the head remains in the vulva for a long time. The same condition may at times be felt on internal examination. There are essentially two types of movements of the child, stretching and rotation.

J. P. GREENHILL.

Jaroschka, K.: *The Course of the First Labor in Advanced Age*. Medizinische Klinik, 1926, xxii, 448.

Nearly all authors who have studied this question come to the conclusion that there is more danger to mother and child among older women than among younger ones. But age alone is not responsible for this. Other factors play a part, notably the constitution of the individual. Among aged primiparas there are two groups, namely, those who conceive late for extraneous causes and those who cannot become pregnant earlier for constitutional reasons. In the latter group the cause may be defective ovarian function or hypoplasia of the genitalia.

The author studied 711 primiparas over twenty-seven years of age and 1804 primiparas under that age. The incidence of contracted pelves among the older women was 8.3 per cent, as compared with 5.2 per cent for the younger ones. This indicates a diminished body development in general, with special underdevelopment of the genitalia.

With increase in age there was an increase in the incidence of premature rupture of the membranes. Deficient uterine contractions occurred three times more often among the older women, and a hypoplastic cervix often gave trouble among the older women.

Among the women under twenty-seven years of age, spontaneous delivery occurred in 87 per cent as compared with 73.7 per cent for the older women. The duration of labor was not longer among the latter, but disturbances of the third stage occurred more often. More of the older women suffered lacerations, but eclampsia did not occur more often.

The children of the older women were as a rule heavier than the others. With increase in maternal age the incidence of operative delivery increased and also the fetal mortality. The bad prognosis of advanced age is due essentially to underdevelopment of the genitalia. The hypoplasia prevents early conception and after conception does take place it causes dystocia and increases the danger to mother and child. There are two distinct types of women with hypoplasia. One is adipose and the other is asthenic and gracile.

J. P. GREENHILL.

Mosher, George Clark: *The Method of Reducing the Maternity Death Rate in Missouri*. Journal of Missouri State Medical Association, 1925, xxii, 133.

Maternal mortality in the United States is exceeded only by that of Spain and Belgium in the sixteen civilized countries of the world. The latest report gives 16.30 per cent per 100,000 population, and of these deaths, 90 per cent are preventable, being due to sepsis, toxemia, and hemorrhage.

The best methods of reducing the mortality are: (1) Prenatal care in the fullest sense. (2) Aseptic care of the patient in labor; (a) Use of rectal examination, with avoidance of vaginal examination, (b) Sterile field, (c) Catheterization when necessary, (d) Boiled instruments, sterile gloves, etc. (3) Watchful waiting in labor. Consultation with specialist in unusual cases. (4) Cesarean section, when done under conditions which are favorable, has its place. (5) Pituitrin may be tolerated in multiparæ with stasis and the head on the perineum. It is never safe in primiparæ or in cases of dystocia.

ADAIR AND CARLSON.



# INDEX TO VOLUME XIII

## A

- Abdominal twin pregnancy, a case of, presenting unusual features, Harrar, James A., 752
- Abortion, induction of, rupture of uterus following, Stamm, C. J., 263
- ACOSTA-SISON, H., A new sagittal pelvimeter, 760
- Actinomyces, peritoneal, with the report of a case, Cherry, T. H., 248
- ADLER, L., Uselessness of the term "metropathy," (Abst.), 273
- AHLFELD, Rectal examination, (Abst.), 759
- ALLEN, E., COMPERE, E. L., JR., AND AUSTIN, W. C., Some results obtained with parathyroid extract in the control of idiopathic menstrual bleeding, 156
- , AND ELLIS, M. M., The effect of ultraviolet rays on the hormones of the ovarian follicle and placenta, (Abst.), 128
- , (WITH PRATT, J. P.), Clinical tests of the ovarian follicular hormone, (Abst.), 123
- ALVAREZ, W. C., AND ZIMMERMANN, A., The relation between celibacy in women and defective pelvic organs, 30
- Amenorrhea, psychic, Bullard, E. A., 393
- Analgesia, rectal ether, in childbirth; technic and results in 6000 cases, Harrar, J. A., 671
- in labor, technic and results in 5800 cases at the New York Lying-In Hospital, Harrar, J. A., 486
- "Anatomia infantis," the, of Gabriel de Zerbi, Crummer, Le Roy, 352
- Anesthesia, pneumonia as a sequel to, Rucker, M. Pierce, 764
- ANDREWS, H. R., Backache in women, (Abst.), 276
- ASCHNER, B., The influence of the hypophysis on the female genital organs, (Abst.), 125
- ASTLEY, B. G., Spinal anesthesia in cesarean section for toxemia of pregnancy, 83, 117
- AUSTIN, WILLIAM C., (WITH ALLEN, E., AND COMPERE, E. L., JR.), Some results obtained with parathyroid extract in the control of idiopathic menstrual bleeding, 156
- AVERETT, L., Nonspecific protein therapy in gynecology, 238, 265

## B

- Backache, chronic, in gynecology, Donagall, (Abst.), 276
- in women, Andrews, H. R. (Abst.), 276
- BADER, C. W., (WITH ENFINGER, H.), Lipoid content of the ovary during pregnancy and atresia of the corpus luteum of menstruation during pregnancy, (Abst.), 122
- BAER AND REIS, The sedimentation test in gynecology, (Abst.), 270
- BAKWIN, H., AND RIVKIN, HELEN, A comparison of the content of potassium in maternal and placental serum, 68
- BARROWS, DAVID NYE, Primary carcinoma of the fallopian tube, with report of three cases, 710
- BELL, W. BLAIR, Ovarian grafting, (Abst.), 129
- BENTIN, W., The so-called puberty gland, (Abst.), 120
- BEUTNER, OSCAR, The transverse excision of the fundus uteri with ovarian conservation, 512, 789
- BLAND, P. B., Hydatidiform mole complicated by perforation of the uterine wall and secondary chorioepithelioma of the pelvis, 189, 265
- BONIFIELD, CHARLES L., Tuberculous peritonitis, 789
- Books received, 278, 418
- BOORSTEIN, S. W., Separation of the symphysis pubis, with a report of six cases, 345
- BORCHARDT, L., Thyreo-sexual insufficiency, (Abst.), 126
- BOUR, D., (WITH TUFFIER, TH.), Ovarian grafts. Experimental and clinical results concerning menstruation, fecundation and pregnancy, (Abst.), 129
- Breast milk, an excellent substitute for, Calhoun, D. A., 96
- postparturient, the fallacy of the present treatment of the, Van Dolson, W. W., 236, 264
- BRONNIKOFF, The method of the blood corpuscle sedimentation reaction and its importance to gynecology, (Abst.), 270
- BROWN, G. VAN AMBER, The developmentally unfit infant, 541
- BULLARD, E. A., Psychic amenorrhea, 393
- BUNZEL, E. E., Pulmonary embolism complicating pregnancy, labor, and the puerperium, 584, 654



## C

- CALHOUN, D. A., An excellent substitute for breast milk, 96
- CAMPBELL, ALEXANDER M., An obstetric tampon, 785
- Carbuncle of the kidney, Furniss, H. D., 650
- Carcinoma of the cervix, prevention of, Charlton, H. R., 755, 798  
of fallopian tube, primary, with report of three cases, Barrows, David Nye, 710
- CARRELL, J. F., Hydramnios in uniovular twins; with report of a case, 243, 262
- , Perineal injuries during parturition, 627, 660
- Celibacy in women and defective pelvic organs, the relation between, Alvarez, W. C., and Zimmermann, A., 30
- Cervix, cancer of the, complicating pregnancy, showing the harmful effects of radium on the fetus, Mundell, J. J., 86  
carcinoma of the, after irradiation, Kimbrough, R. A. and Norris, C. C., 279  
prevention of, Charlton, H. R., 755, 798  
uteri, carcinoma of the, Clark, J. G., and Ferguson, L. K., 144  
carcinoma of the, Fluhmann, C. F., 174  
during labor, protection of the, McDonald, A. L., 76
- Cesarean scar, spontaneous rupture of a, Williamson, H. C., 391  
observed during laparotomy for second cesarean, Ely, W., 262  
section, abdominal, in Detroit in 1926, Welz, W. E., 361  
bacterial contents of the uterus at, Harris, J. W., 133  
in 96 patients, an analysis of the results in 130 pregnancies subsequent to, Rice, F. W., 591  
indications and technique of, Lull, C. B., 633  
low or cervical, the obstetric future of women delivered by the, Phancuf, L. E., 446  
narcotic local anesthesia in, Keller, F. E., 234, 260  
ruptured uterus during the second labor after, a case of, Thornhill, P. E., 784  
the morbidity and mortality of, Montgomery, T. L., 610  
the obstetric future of women after, Phancuf, L. E., 669
- CHARLTON, H. R., Prevention of carcinoma of the cervix, 755, 798

- CHERRY, THOMAS H., Peritoneal actinomyces, with the report of case, 248
- Choriocarcinoma of the uterus complicating pregnancy, Gill, J. E., vol. xii, 203\*
- CLARK, JOHN C., AND FERGUSON, L. K., Carcinoma of the cervix uteri as treated in the gynecologic department of the University Hospital (series II, 1919-1923), 144
- Collective Reviews:  
New books, Frank, R. T., 402  
The obstetric literature of 1926, Greenhill, J. P., 676, 807
- COMPERE, E. L., JR., (WITH ALLEN, E., AND AUSTIN, W. C.), Some results obtained with parathyroid extract in the control of idiopathic menstrual bleeding, 156
- CONWAY, W. P., Placenta previa associated with severe toxemia, 260
- Corpus luteum and placenta, experimental research on the inner secretions of the, Wintz, (Abst.), 121  
a specific inhibitory hormone of the, Pananicolau, G., (Abst.), 121  
pathology of the, Dignani, P. B., Onorato, F. P., and Piccardo, E. R., (Abst.), 122
- CORWIN, JEAN, (WITH HERRICK, VALENTINE AND WILSON), Pregnancy and heart disease, 617
- CRAINCIANU, AL., Experimental researches upon the relations between the internal secretion of the ovary and the tonus of the vegetative system, (Abst.), 124
- CRILE, G. W., Comparison of methods used in treatment of malignancy, 529
- CRON, R. S., AND GEY, G., The viability of the east-off menstrual endometrium, 645
- CRUMMER, LE ROY, The "anatomia infantis" of Gabriel de Zerbi, 352
- , Visceral manikins in carved ivory, 26

## D

- DALY, W. P., A case of intraabdominal pregnancy, with living child, 649
- DAVIS, A. B., Fetal death with retention of fetus in utero and necrosis of uterus, 259
- , The ruptured uterus, 522
- Dermoid cysts, bilateral, of the ovaries in a young girl, report of, McDowell, J. P., 253
- DESSER, A. L., A case of eclampsia with relatively low blood pressure, 647

\*Omitted in Index of Vol. xii.

- DIECKMANN, W. J. (WITH SCHWARZ, O. H.), Puerperal infection due to anaerobic streptococci, 467, 791
- DIETRICH, A. forme fruste of dystrophia adiposogenitalis and its experimental basis, (Abst.), 125
- DIGNANI, P. B., Pathology of the corpus luteum, (Abst.), 122
- DOERFLER, H., Spurious pregnancy, (Abst.), 731
- DOUGAL, Chronic backache in gynecology, (Abst.), 276
- Dystrophia adiposogenitalis, a forme fruste of, and its experimental basis, Dietrich, (Abst.), 125

## E

- Eclampsia, a case of, with relatively low blood pressure, Desser, A. L., 647
- magnesium sulphate intravenously in, is it warranted, Lazard, E. M., 720
- Ectopic endometrium in the ovary and inguinal canal, Schmitz, Edgar F., 705
- ELKIN, D. C., Vicarious (supplementary) menstruation, with the report of a case, 65
- ELLIS, M. M. (WITH ALLEN, E.), The effect of ultraviolet rays on the hormones of the ovarian follicle and placenta, (Abst.), 128
- ELY, W., Spontaneous rupture of cesarean scar observed during laparotomy for second cesarean, 262
- Embolism, pulmonary, complicating pregnancy, labor and the puerperium, Bunzel, E. E., 584
- Emotional life of woman in relation to the practice of gynecology, Macomber, Donald, 732, 804
- Endocrine glands, particularly of the ovary, structure and functions of the, Fraenkel, L., 606
- Endometrial tissue in the abdominal scar following cesarean section, Schwarz, O. H., 331
- Endometriosis of the rectovaginal septum, obstructing, treatment of, Graves, William P., 728
- Endometritis, syncytial, and syncytioma, Rosenzweig, M., 563
- Endometrium, ectopic, in the ovary and inguinal canal, Schmitz, Edgar F., 705
- ENFINGER, H., AND BADER, C. W., Lipoid content of the ovary during pregnancy and atresia of the corpus luteum of menstruation during pregnancy, (Abst.), 122
- Epilepsy, endocrine forms of, Sserdjukoff, M. G., (Abst.), 125

## F

- Fallopian tube, primary carcinoma of, with report of three cases, Barrows, David Nye, 710
- FALLS, FREDERICK HOWARD, The pathogenesis of pemphigus neonatorum, 774
- FALTA, The use of corpuscle sedimentation in obstetrics and gynecology, (Abst.), 270
- FEINER, D., Intramural abscess of uterus, 323
- FEKETE, A., The disturbances of menstruation and the influence of organ extracts upon them, (Abst.), 127
- FERGUSON, L. KRAEER, (WITH CLARK, J. G.), Carcinoma of the cervix uteri as treated in the gynecologic department of the University Hospital (series II, 1919-1923), 144
- Fetal death with retention of fetus in utero and necrosis of uterus, Davis, A. B., 259
- Fetus in utero, can quinine kill the, Gellhorn, George, 775
- the respiratory exchange of the, Stander, H. J., 39
- Fibromata, ovarian, multiple, Wolfe, S. A., 16
- FINDLEY, P., The biologic defense in puerperal infection, 514, 792
- FLUHMAN, C. F., Carcinoma of the cervix uteri, a clinical and pathologic study, 174
- FRAENKEL, L., Structure and functions of the endocrine glands, particularly of the ovary, 606
- The principles of the treatment of genital prolapse. The technic of ventrofixation of the vagina, 757
- FRANK, The occurrence and present chemical status of the female sex hormone, (Abst.), 122
- FRIEDLAENDER, B., Functional diseases of the female genital organs, 43
- FROMMELT AND MOTILOFF, The blood sedimentation test in gynecology, (Abst.), 272
- FROMMOLT, Dangers and mistakes in diagnosis in using pertubation, (Abst.), 272
- FROSCH, Sedimentation test in obstetrics and gynecology, (Abst.), 272
- Functional diseases of the female genital organs, Friedlaender, B., 43
- FURNISS, H. D., Carbuncle of the kidney, 650

## G

- GELLHORN, GEORGE, Can quinine kill the fetus in utero? 775
- Genital prolapse, treatment of, principles of the, Fraenkel, L., 757

- GEY, G., (WITH CRON, R. S.), The viability of the cast-off menstrual endometrium, 645
- GILL, JOHN E., Report of a case of choriocarcinoma of the uterus complicating pregnancy, Vol. xii, 203
- GORDON, C. A., The conduct of labor and the management of obstetric emergencies. An analysis of 6562 consecutive cases of labor conservatively managed, 501, 665
- GOSSETT, WALKER, Report of a case of umbilical cord coiled five times around infant's neck, 783
- GOTO, N., Experimental investigations of the internal secretion of the ovary by means of rat parabiosis, (Abst.), 120
- GRAVES, WILLIAM P., The treatment of obstructing endometriosis of the rectovaginal septum, 728
- GREENHILL, J. P., The obstetric literature of 1926, (collective review), 676, 807
- GREER, E. D. (WITH PADDOCK, R.), The origin of the common cystic structures of the human placenta, 164
- GROSSER, O., The time of ovulation and the prognosis of artificial insemination, 356
- GUSTAVSON, The occurrence and present chemical status of the female sex hormone, (Abst.), 122
- Gynecologic bleeding, the causes and treatment of, Seitz, A., (Abst.), 274
- Gynecology, practice of, emotional life of woman in relation to, Macomber, Donald, 732, 804
- H
- HAMILTON, B. E., AND KELLOGG, F. S., Observations on heart disease complicating pregnancy, 535
- HANCHER AND ROGERS, The diagnosis and treatment of hypoovarianism, (Abst.), 123
- HARRAR, J. A., Rectal ether analgesia in childbirth, 671
- , Rectal ether analgesia in labor. Technic and results in 5800 cases at the New York Lying-In Hospital, 486
- , A case of abdominal twin pregnancy presenting unusual features, 752, 797
- HARRIS, J. W., The bacterial content of the uterus at cesarean section, 133
- HAUCH, Female pelvic neuralgias, (Abst.), 272
- Heart disease and pregnancy, Corwin, Jean, Herrick, W. W., Valentine, Muriel, and Wilson, Jessie M., 617
- observations on, complicating pregnancy, Hamilton, B. E., and Kellogg, F. S., 535
- Hemorrhage, treatment of profuse, by the transplantation of ovarian tissue, Sippel, P., (Abst.), 132
- HERRICK, W. W., (WITH CORWIN, VALENTINE AND WILSON), Pregnancy and heart disease, 617
- HINTON, J. W., The significance of thyroid enlargement during pregnancy, 204
- HOLLOWAY, The occurrence and present chemical status of the female sex hormone, (Abst.), 122
- Hormone, female sex, the occurrence and present chemical status of the, Frank, Gustavson, Holloway, Hyndman, Krueger, and White, (Abst.), 122
- ovarian follicular, clinical tests of the, Pratt, J. P., and Allen, E., (Abst.), 123
- Hormones, of the ovarian follicle and placenta, the effect of ultraviolet rays on the, Allen, E., and Ellis, M. M. (Abst.), 128
- HOTTENSTEIN, H. W., AND KLINGMAN, W. O., Purpura hemorrhagica complicating pregnancy, 375
- HUET, Rupture and perforation of pyosalpinx into the peritoneal cavity, (Abst.), 277
- HURD, RALPH A., Results of operations for retroversion, 742, 801
- Hydatidiform mole complicated by perforation of the uterine wall and secondary chorioepithelioma of the pelvis, Bland, P. B., 189, 265
- Hydramnios in uniovular twins, Carrell, J. F., 243, 262
- HYNDMAN, The occurrence and present chemical status of the female sex hormone, (Abst.), 122
- Hyperemesis gravidarum, the treatment of, with particular reference to the use of glucose and insulin, Waters, E. G., 92
- Hypoovarianism, the diagnosis and treatment of, Hancher and Rogers, (Abst.), 123
- Hypophysis, the influence of the, on the female genital organs, Aschner, B., (Abst.), 125
- Hysterectomy, vaginal, and its indications, Kennedy, J. W., 506, 673
- I
- Infant, the developmentally unfit, Brown, G. Van Amber, 541

Infencephalus, with the report of a case, Welz, W. E., and Lieberman, B. L., 184

Insemination, artificial, the time of ovulation and the prognosis of, Grosser, O., 356

Intramural abscess of uterus, Feiner, D., 323

## J

JARCHO, J., Krukenberg tumors and their practical problems, 288

JAROSCHKA, K., The course of the first labor in advanced age, (Abst.), 814

## K

KAHN, I. W., Urinary disturbances following gynecologic operations, 378

KELLER, F. E., Narco local anesthesia in cesarean section, 234, 260

KELLOGG, F. S., (WITH HAMILTON, B. E.), Observations on heart disease complicating pregnancy, 535

KENNEDY, J. W., Vaginal hysterectomy and its indications, 506, 673

KIMBROUGH, R. A., and NORRIS, C. C., Factors influencing end-results in carcinoma of the cervix after irradiation, 279, 399

KLINGMAN, W. O. (WITH HOTTENSTEIN, H. W.), Purpura hemorrhagica complicating pregnancy, 375

KNAUS, H. H., The action of pituitary extract administered by the alimentary canal, (Abst.), 127

KRELL, S., Blood dyscrasia complicating pregnancy and puerperium with a report of two cases, 108

KRUEGER, The occurrence and present chemical status of the female sex hormone, (Abst.), 122

Krukenberg tumors and their practical problems, Jarcho, J., 288

KUSTNER, H., Does the child help itself during labor, (Abst.), 813

— The internal secretory changes after extirpation of the uterus, operative castration, roentgen ray castration and the normal climacterium, (Abst.), 128

## L

Labor and the management of obstetric emergencies, the conduct of. An analysis of 6562 consecutive cases of labor conservatively managed, Gordon, C. A., 501

does the child help itself during, Küstner, H., (Abst.), 813

induction of, observations on the use of castor oil, quinine, and pituitary extract in the, Mathieu, A., 223

Labor—Cont'd

protection of the cervix uteri during, McDonald, A. L., 76

rectal ether analgesia in, Harrar, J. A., 486

the conduct of, and the management of obstetric emergencies, Gordon, C. A., 665

the course of the first, in advanced age, Jaroschka, K., (Abst.), 814

LANDECKER, A., The significance of combined organotherapy and ultraviolet radiation for the functional disturbances of the female genitalia, (Abst.), 128

LIEBERMAN, B. L., (WITH WELZ, W. E.), Infencephalus, with the report of a case, 184

LAZARD, E. M., Magnesium sulphate intravenously in eclampsia, is it warranted? Clinical results, vs. experimental evidence, 720

Lipiodol injection of the uterus and oviduct, Randall, L. M., 457

Liquor amnii, the secretion and absorption of the, and its disturbance in the presence of monstrosities, Schmidt, H. R., (Abst.), 813

LULL, C. B., Indications and technic of cesarean section, 633

Luteoma, ovarian, Wolfe, S. A., 575

## Mc

MCCAFFREY, L. E., The umbilical cord encircling the neck and its relation to intrapartum complications, 104

MCCORD, J. R., A study of three hundred pregnant negro women having a four-plus Wassermann, 389

— The reliability of the Wassermann reaction in pregnancy, a report of five hundred cases, 252

— The results obtained in treated and untreated cases of syphilis in pregnant negro women, 100

MCDONALD, A. L., Protection of the cervix uteri during labor, 76

MCDOWELL, J. P., Report of bilateral dermoid cysts of the ovaries in a young girl, 253

## M

MACOMBER, DONALD, The emotional life of woman in relation to the practice of gynecology, 732, 804

Magnesium sulphate intravenously in eclampsia, is it warranted, Lazard, E. M., 720

Malignancy, comparison of methods used in treatment of, Crile, G. W., 529

MANSFIELD, Replacing and regulating ovarian function, (Abst.), 132

## Maternal Welfare Department:

- Maternal mortality. The risk of death in childbirth from all diseases caused by pregnancy and confinement, 113
- Maternity work in the Colony of Hong-kong, 254
- Report of the Committee on Maternal Welfare, Mosher, George Clark, 787
- Maternity death rate in Missouri, method of reducing the, Mosher, George Clark, (Abst.), 814
- MATHIEU, ALBERT, Observations on the use of castor oil, quinine, and pituitary extract in the induction of labor, 223
- Menopause, metrorrhagia caused by tumors and cysts of the ovary occurring after the, Moulouguet-Doleris, P., (Abst.), 275
- Menstrual disorders, treatment of, by roentgen rays, Rongy, A. J., 593
- disturbances, some, and their treatment with the opposing principles of corpus luteum, Pallen, Conde de S., (Abst.), 124
- endometrium, the viability of the cast-off, Cron, R. S., and Gey, G., 645
- Menstruation, the disturbance of, and the influence of organ extracts upon them, Fekete, A., (Abst.), 127
- vicarious (supplementary), with the report of a case, Elkin, D. C., 65
- Metritis and its treatment, true hemorrhagic, Schil, (Abst.), 274
- Metroendometritis and metropathy, Sellheim, (Abst.), 275
- Metropathy, uselessness of the term, Adler, L., (Abst.), 273
- Metrorrhagia caused by tumors and cysts of the ovary occurring after the menopause, Moulouguet-Doleris, P., (Abst.), 275
- MILLER, N. F., Pregnancy following inversion of the uterus, 307
- MOENCH, G. L., A consideration of some of the aspects of sterility, 334, 394
- Uterus duplex bicollis, vagina simplex, and superfetation, 60
- Monstrosities, the secretion and absorption of the liquor amnii and its disturbance in the presence of, Schmidt, H. R., (Abst.), 813
- MONTGOMERY, T. L., The morbidity and mortality of cesarean section, 610, 658
- MOSHER, GEORGE CLARK, Report of the Committee on Maternal Welfare to the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, 787
- MOSHER, GEORGE CLARK—Cont'd
- The Apostle of Casuistry in Medicine. An idealization of Theophilus Parvin, 419
- The method of reducing the maternity death rate in Missouri, (Abst.), 814
- MOTILOFF, (WITH FROMMELT), The blood sedimentation test in gynecology, (Abst.), 272
- MOULONGUET-DOLERIS, P., Metrorrhagia caused by tumors and cysts of the ovary occurring after the menopause, (Abst.), 275
- MUNDELL, J. J., Cancer of the cervix complicating pregnancy, showing the harmful effects of radium on the fetus, 86
- MURPHY, A. J., Spinal anesthesia in gynecology, with a report of fifty cases, 214
- MUSSELMAN, L., Report of a case of interstitial pregnancy with well preserved fetal cavity, 23

## N

- Narco local anesthesia in cesarean section, Keller, F. E., 234, 260
- Neuralgias, female pelvie, Haueh, (Abst.), 272
- NITSCHMANN, Our experience with the erythrocyte sedimentation test in gynecology, (Abst.), 271
- NORRIS, C. C., (WITH KIMBROUGH, R. A.), Factors influencing end-results in carcinoma of the cervix after irradiation, 279, 399
- NOYES, I. H., Uterine prolapse associated with spina bifida in the newborn, with report of a case, 209

## O

- Obstetric emergencies, the conduct of labor and the management of, Gordon, C. A., 665
- examinations, reducing the danger of, Sellheim, H., (Abst.), 704
- tampon, Campbell, Alexander M., 785
- Oligohydramnios, an inquiry into the cause of, Schiller, Walter, and Toll, R. M., 689
- ONORATO, F. P., Pathology of the corpus luteum, (Abst.), 122
- Organotherapy and ultraviolet radiation, the significance of, for the functional disturbances of the female genitalia, Landecker, A., (Abst.), 128
- Ovarian and uterine cycle, the, Vignes, (Abst.), 124

## Ovarian—Cont'd

- conservation, the transverse excision of the fundus uteri with, Bentsner, O., 512
- function, replacing and regulating, Mansfield, (Abst.), 132
- grafting, Bell, W. Blair, (Abst.), 129
- grafts, Taffier, Th., and Bour, D., (Abst.), 129
- tissue, treatment of profuse hemorrhage by the transplantation of, Sippel, P., (Abst.), 132
- Ovaries in a young girl, report of bilateral dermoid cysts of the, McDowell, J. P., 253
- intrauterine transplantation of the, Sserdukoff, M. G., (Abst.), 131
- the homoplastic transplantation of, in schizophrenia, Sippel, P., (Abst.), 131
- transplantation of the, into the uterus, Rouffart-Thiriard, (Abst.), 130
- Ovary and inguinal canal, ectopic endometrium in the, Schmitz, Edgar F., 705
- internal secretion of the, and the tonus of the vegetative system, Crainiciann, Al., (Abst.), 124
- experimental investigations of the, by means of rat parabiosis, Goto, N., (Abst.), 120
- lipoid content of the, during pregnancy and atresia of the corpus luteum of menstruation during pregnancy, Eufenger, H., and Bader, C. W., (Abst.), 122
- structure and functions of the endocrine glands, particularly of the, Fraenkel, L., 606
- Ovulation, the time of, and the prognosis of artificial insemination, Grosser, O., 356

## P

- PADDOCK, R., AND GREER, E. D., The origin of the common cystic structures of the human placenta, 164
- PALLEN, Some menstrual disturbances and their treatment with the opposing principles of corpus luteum, (Abst.), 124
- PAPANICOLAOU, G., A specific inhibitory hormone of the corpus luteum, (Abst.), 121
- Parathyroid extract, some results obtained with, in the control of idiopathic menstrual bleeding, Allen, E., Compere, E. L., Jr., and Austin, W. C., 156
- Farvin, Theophilus, an idealization of, Mosher, George C., 419
- Pelvimeter, a new sagittal, Acosta-Sison, H., 760
- Pemphigus neonatorum, pathogenesis of, Falls, Frederick Howard, 774

- Perineal injuries during parturition, Carrell, J. F., 627
- Peritonitis, tuberculous, Bonifield, Charles L., 789
- Perturbation, dangers and mistakes in diagnosis in using, Frommolt, (Abst.), 272
- PHANEUF, L. E., The obstetric future of women delivered by the low or cervical cesarean section, 446, 669
- PICCARDO, E. R., Pathology of the corpus luteum, (Abst.), 122
- PIGHINI, G., The action of thyroid extract upon the fetus and pregnant uterus, (Abst.), 127
- Pituitary extract, the action of, administered by the alimentary canal, Knaus, H. H., (Abst.), 127
- Placenta circumvallata, J. Whitridge Williams, 1
- experimental research on the inner secretion of the corpus luteum and, Wintz, (Abst.), 121
- previa associated with severe toxemia, Conaway, W. P., 260
- the origin of the common cystic structures of the human, Paddock, R., and Greer, E. D., 164
- Pneumonia as a sequel to anesthesia, Rucker, M. Pierce, 764
- POLAK, J. O., The details of postpartum care, 432, 665
- POLLART, R., Insufflation of the tubes, (Abst.), 273
- Postpartum care, the details of, Polak, J. O., 432, 665
- PRATT, J. P., AND ALLEN, E., Clinical tests of the ovarian follicular hormone, (Abst.), 123
- Pregnancy, abdominal twin, a case of, presenting unusual features, Harrar, James A., 752, 797
- and heart disease, Corwin, Jean, Herriek, W. W., Valentine, Muriel, and Wilson, Jessie, M., 617
- and labor, the advantages of rectal palpation during, Stuckert, H., 642
- and puerperium, blood dyscrasia complicating, with a report of two cases, Krell, S., 108
- choriocarcinoma of the uterus complicating, Gill, J. E., vol. xii, p. 203
- following inversion of the uterus, Miller, N. F., 307
- interstitial, with well preserved fetal cavity, report of a case of, Musselman, L., 23
- intraabdominal, with living child, Daly, W. P., 649
- labor and the puerperium, pulmonary embolism complicating, Bunzel, E. E., 584

## Pregnancy—Cont'd

- observations on heart disease complicating, Hamilton, B. E., and Kellogg, F. S., 535
- purpura hemorrhagica complicating, Hottenstein, H. W., and Klingman, W. O., 375
- spurious, Doerfler, H., (Abst.), 731
- the reliability of the Wassermann reaction in, McCord, J. R., 252
- thyroid enlargement during, the significance of, Hinton, J. W., 204
- toxemia of, spinal anesthesia in cesarean section for, Astley, B. G., 83, 117
- toxemias of, clinical and experimental studies in the, Stander, H. J., 551
- Pregnancies, 130 subsequent to cesarean section in 96 patients, an analysis of the results in, Rice, F. W., 591
- Prenatal study and what it accomplishes, Welton, T., 494, 665
- Protein therapy, nonspecific, in gynecology, Averett, L., 238, 265
- Puberty gland, the so-called, Benthin, W., (Abst.), 120
- Purpura hemorrhagica complicating pregnancy, Hottenstein, H. W., and Klingman, W. O., 375
- Puerperal infection due to anaerobic streptococci, Schwarz, O. H., and Dieckmann, W. J., 467, 792
- the biologic defense in, Findley, P., 514, 792
- Pyosalpinx, rupture and perforation of, into the peritoneal cavity, Huet, (Abst.), 277

## R

- RANDALL, L. M., Lipiodol injection of the uterus and oviduct, 457, 790
- REIS, (WITH BAER), The sedimentation test in gynecology, (Abst.), 270
- Rectal examination, Ahlfeld, (Abst.), 759
- Rectovaginal septum, treatment of obstructing endometriosis of the, Graves, William P., 728
- Retroversion, results of operations for, Hurd, Ralph A., 742, 801
- RICE, F. W., An analysis of the results in 130 pregnancies subsequent to cesarean section in 96 patients, 591, 651
- RIVIERE, J., A contribution to the physical therapy of uterine affections, 518
- RIVKIN, HELEN, (WITH BAKWIN, H.), A comparison of the content of potassium in maternal and placental serum, 68
- ROCHET, (WITH TIXIER), Salpingitis in elderly women, (Abst.), 277

- Roentgen ray treatment of benign gynecologic diseases, Werner, Paul, 54
- ROGERS, (WITH HANCHER), The diagnosis and treatment of hypoovarianism, (Abst.), 123
- RONGY, A. J., Treatment of menstrual disorders by roentgen rays, 598
- ROSENZWEIG, M., Syneptial endometritis and syneptioma, 563
- ROUFFART-THIRIAR, Transplantation of the ovaries into the uterus, (Abst.), 130
- RUCKER, M. PIERCE, Pneumonia as a sequel to anesthesia, 764

## S

- Salpingitis in elderly women, Tixier and Rochet, (Abst.), 277
- SCHIL, True hemorrhagic metritis and its treatment, (Abst.), 274
- SCHILLER, WALTER, AND TOLL, R. M., An inquiry into the cause of oligohydramnios, 689
- SCHMIDT, H. R., The secretion and absorption of the liquor amnii and its disturbance in the presence of monstrosities, (Abst.), 813
- SCHMITZ, EDGAR F., Ectopic endometrium in the ovary and inguinal canal, 705
- SCHWARZ, O. H., Endometrial tissue in the abdominal sear following cesarean section, 331
- AND DIECKMANN, W. J., Puerperal infection due to anaerobic streptococci, 467, 792
- Secretory changes, the internal, after extirpation of the uterus, operative castration, roentgen ray castration, and the normal climacterium, Küstner, H., (Abst.), 128
- Sedimentation in obstetrics and gynecology, the use of corpusele, Falta, (Abst.), 270
- reaction and its importance to gynecology, the method of blood corpusele, Bronnikoff, (Abst.), 270
- test of practical value in gynecology, is the, Williams, P. F., 228, 261
- in gynecology, Baer and Reis, (Abst.), 270
- in gynecology, Nitschmann, (Abst.), 271
- the blood, Frommelt and Motiloff, (Abst.), 272
- the blood, Silzer, O., (Abst.), 271
- in obstetrics and gynecology, Frosch, (Abst.), 272
- SEITZ, A., The causes and treatment of gynecologic bleeding, (Abst.), 274
- Selected abstracts:
- Endocrinology and ovarian transplantation, 120
- Gynecologic diagnosis, 270

SELLHEIM, Metroendometritis and metropathy, (Abst.), 275

SELLHEIM, H., Reducing the danger of obstetric examinations, (Abst.), 704

Serum, maternal and placental, a comparison of the content of potassium in, Bakwin, H., and Rivkin, H., 68

SEYMOUR, H. F., Endoscopy of the uterus, with a description of a hysteroscope, (Abst.), 273

SILZER, O., The blood sedimentation test in gynecology, (Abst.), 271

SIPPEL, P., The homeoplastic transplantation of ovaries in schizophrasia, (Abst.), 131

—, The treatment of profuse hemorrhage by the transplantation of ovarian tissue, (Abst.), 132

Society Transactions:

American Association of Obstetricians, Gynecologists and Abdominal Surgeons, 665, 789

Brooklyn Gynecological Society, 399, 656, 804

New Orleans Gynecological and Obstetrical Society, 265

New York Obstetrical Society, 393, 650, 797

Obstetrical Society of Philadelphia, 117, 259, 262, 658

Spina bifida in the newborn, uterine prolapse associated with, Noyes, I. H., 209

Spinal anesthesia in cesarean section for toxemia of pregnancy, Astley, B. G., 83, 117

in gynecology, with a report of fifty cases, Murphy, A. J., 214

SSERDJUKOFF, M. G., Endocrine forms of epilepsy, (Abst.), 125

Intrauterine transplantation of the ovaries, (Abst.), 131

STAMM, C. J., Rupture of uterus following induction of abortion, recovery, 263

STANDER, H. J., Clinical and experimental studies on the toxemias of pregnancy, 551, 656

—, The respiratory exchange of the fetus, 39

Sterility, a consideration of some of the aspects of, Moench, G. L., 334, 394

STUCKERT, H., The advantages of rectal palpation during pregnancy and labor, 642, 662

Superfetation, uterus duplex bicollis, vagina simplex, and, Moench, G. L., 60

Symphysis pubis, separation of the, and fracture of the ascending ramus with normal delivery, Walker, J., 623

Symphysis pubis, separation of—Cont'd with report of six cases, Boorstein, S. W., 345

Syphilis, the results obtained in treated and untreated cases of, in pregnant negro women, McCord, J. R., 100

## T

Tampon, obstetric, Campbell, Alexander M., 785

THORNHILL, P. E., A case of ruptured uterus during the second labor after cesarean section, 784

Thyreo-sexual insufficiency, Borchardt, L., (Abst.), 126

Thyroid extract, the action of, upon the fetus and pregnant uterus, Pighini, G., (Abst.), 127

TIXIER AND ROCHET, Salpingitis in elderly women, (Abst.), 277

TOLL, E. M., (WITH SCHILLER, WALTER), An inquiry into the cause of oligohydramnios, 689

TOTTENHAM, R. E., Maternity work in the colony of Hongkong, 254

Toxemia of pregnancy, spinal anesthesia in cesarean section for, Astley, B. G., 83, 117

placenta previa associated with severe, Conaway, W. P., 260

Toxemias of pregnancy, clinical and experimental studies on the, Stander, H. J., 551

Tuberculous peritonitis, Bonifield, Charles L., 789

Tubes, insufflation of the, Pollart, R., (Abst.), 273

TUFFIER, T., AND BOUR, D., Ovarian grafts. Experimental and clinical results concerning menstruation, fecundation and pregnancy, (Abst.), 129

## U

Umbilical cord, the, encircling the neck and its relation to intrapartum complications, McCaffrey, L. E., 104

report of a case of, coiled five times around infant's neck, Gossett, Walker, 783

Urinary disturbances following gynecologic operations, Kahn, I. W., 378

URNER, J. A., Some observations on the vaccination of pregnant women and newborn infants, 70

Uterine affections, a contribution to the physical therapy of, Riviere, J., 518

Uterus duplex bicollis, vagina simplex, and superfetation, Moench, G. L., 60



## Uterus—Cont'd

- endoscopy of the, Seymour, H. F., (Abst.), 273  
 necrosis of, fetal death with retention of fetus in utero, and, Davis, A. B., 259  
 rupture of, following induction of abortion, Stamm, C. J., 263  
 ruptured, a case of, during the second labor after cesarean section, Thornhill, P. E., 784  
 the bacterial content of the, at cesarean section, Harris, J. W., 133  
 the ruptured, Davis, Asa B., 522

## V

- Vaccination of pregnant women and newborn infants, some observations on the, Urner, J. A., 70  
 Vagina simplex, uterus duplex bicollis, and superfetation, Moench, G. L., 60  
 technic of ventrofixation of the, Fraenkel, L., 757  
 VALENTINE, M., (WITH CORWIN, HERRICK AND WILSON), Pregnancy and heart disease, 617  
 VAN DOLSEN, W. W., The fallacy of the present treatment of the postparturient breast, 236, 264  
 VIGNES, The ovarian and uterine cycle, (Abst.), 124  
 Visceral manikins in carved ivory, Crummer, LeRoy, 26

## W

- WALKER, J., Report of a case of separation of the symphysis pubis and fracture of the ascending ramus with normal delivery, 623, 658  
 Wassermann, a four-plus, a study of three hundred pregnant negro women having, McCord, J. R., 389

## Wassermann—Cont'd

- reaction, the reliability of the, in pregnancy, McCord, J. R., 252  
 WATERS, E. G., The treatment of hyperemesis gravidarum, with particular reference to the use of glucose and insulin, 92  
 WELTON, T., Prenatal study and what it accomplishes, 494, 665  
 WELZ, W. E., Abdominal cesarean section in Detroit in 1926, 361  
 — AND LIEBERMAN, B. L., Inicnecephalus, with the report of a case, 184  
 WERNER, P., Roentgen ray treatment of benign gynecologic diseases, 54  
 WHITE, the occurrence and present chemical status of the female sex hormone, (Abst.), 122  
 WILLIAMS, J. WHITRIDGE, Placenta circumvallata, 1  
 WILLIAMS, P. F., Is the sedimentation test of practical value in gynecology? 228, 261  
 WILLIAMSON, H. C., Spontaneous rupture of a cesarean scar, 391  
 WILSON, JESSIE M. (WITH CORWIN, HERRICK, AND VALENTINE), Pregnancy and heart disease, 617  
 WINTZ, Experimental research on the inner secretion of the corpus luteum and placenta, (Abst.), 121  
 WOLFE, S. A., Ovarian luteoma, 575  
 —. Two rare ovarian tumors. Adenofibroma and dermoid cyst associated with multiple ovarian fibromata, 16  
 Woman, emotional life of, in relation to the practice of gynecology, Macomber, Donald, 732, 804

## Z

- ZIMMERMANN, A., (WITH ALVAREZ, W. C.), The relation between celibacy in women and defective pelvic organs, 30

